PWC
Fayetteville's
HOMETOWN UTILITY

CONTRACT DOCUMENTS &

TECHNICAL SPECIFICATIONS

PWC 2223058

SRF # CS370434-15/16

BIG ROCKFISH CREEK OUTFALL CONTACT II
VOLUME I-SECTIONS A THROUGH E

ISSUED FOR BID

JUNE 2023

Fayetteville Public Works Commission
Administrative Building
955 Old Wilmington Road
Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL CONTACT II

FAYETTEVILLE PUBLIC WORKS COMMISSION

FAYETTEVILLE, NORTH CAROLINA

LICENSED NORTH CAROLINA REGISTERED ENGINEERS

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS	ENGINEER OF RECORD
Volume I • Bid Form (Part A & Part B) • Section C-Division 1 • Section D-Technical Specifications (Sewer/Water-Part A & Part B) **Prepared by:** McKim & Creed, Inc. 1730 Varsity Drive, Suite 500 Raleigh, NC 27606 License No. F-1222	
Volume I • Bid Form (Part C) • Section E-Division 1 **Volume II** • Appendix E and H • **Prepared by:** W.K. Dickson & Co., Inc. 720 Corporate Center Drive Raleigh, NC 27607 License No. F-0374	 **Jun 13 2023 1:01 PM**

TABLE OF CONTENTS

SECTION A – PROJECT SPECIFICS GENERAL

ADVERTISEMENT FOR BID
FAYETTEVILLE PUBLIC WORKS COMMISSION
BIG ROCKFISH CREEK OUTFALL CONTRACT II

Cumberland County
North Carolina

Pursuant to N.C.G.S 143-129, sealed bids are solicited and will be received at Fayetteville Public Works Commission, Administration Building, Conference Room 107, 955 Old Wilmington Road, Fayetteville, NC 28301, until **2:00 p.m., EST Tuesday, July 18, 2023**, at which time they will be publicly opened and read for construction of:

Approx. 11,180 linear feet of 24-inch gravity sewer, and 3,595 linear feet of 18-inch gravity sewer along Big Rockfish Creek (Upchurch Lake) and Stewarts Creek, extending from Sta. 116+88 to Sta. 265+63 (MH107 incl.) of the BRCO alignment. This outfall extends under Camden Road, and routes between multiple houses, and includes approximately 630 LF of guided bore and jack installation. The contract includes the demolition of the existing Camden Glen Lift Station and connection to the main outfall with approximately 850 linear feet of 8-inch gravity sewer, which includes approximately 410 linear feet of guided bore and jack under the controlled access of I-295. This project requires stream crossings, stream bank stabilization, trenchless construction, bypass pumping, post-inspection of the completed gravity sewer and all other items necessary to provide a complete project. The foregoing description shall not be construed as a complete description of all work required. All work shall be done in accordance with PWC technical specifications and standard contract terms.

A **MANDATORY** pre-bid meeting will be held at **2:00 p.m., EST Thursday, June 22, 2023, via web conference.** All potential bidders must email Tanya Hazlett, Procurement Advisor at tanya.hazlett@faypwc.com of their intent to attend, and to be added to the meeting ID: 289 249 356 687 passcode qB5WY8 Potential bidders will have the ability to join the virtual meeting via phone at: (910) 302-6113 with Phone Conference ID 112 373 165# and/or via Microsoft Teams. It is encouraged to utilize Microsoft Teams as this pre-bid meeting may contain a presentation of plans and an agenda. Should you need assistance accessing Microsoft Teams via web, smart phone, or tablet, please contact Tanya Hazlett via email at the email address listed above or via phone at (910) 223-4023.

Questions will be fielded at the pre-bid meeting and all prospective bidders are required to attend the meeting. Individual telephone inquiries are prohibited. The PWC assumes no responsibility to fully inform absentees of clarifications not issued by addendum.

PWC has received financial assistance from the State of North Carolina (the “State”) under the State Revolving Fund Program (SRF). The SRF program includes provisions that establish goals and other requirements relating to participation by certified Minority Business Enterprises (MBE)/Women Business Enterprises, wage rates set forth under the Davis Bacon Act, and requirements of the American Iron and Steel Act. The Bidder to whom the contract is awarded shall comply with the statutory requirements of these provisions as specified within the contract documents. HUB Certified contractors are encouraged to submit a bid for this project.

All bidders are notified that the requirements of the SRF program for Minority and Women Business Enterprise Plan for Construction, Procurement, and Professional Services shall be adhered to in the submission of all bids and shall be made a part of this contract.

Bids must be enclosed in a sealed envelope addressed to Tanya Hazlett, Procurement Advisor, Fayetteville Public Works Commission, 955 Old Wilmington Road, Fayetteville, North Carolina 28301. The outside of the envelope must be marked **SEALED BID: BIG ROCKFISH CREEK OUTFALL CONTRACT II** and shall indicate the name, address and state license number of the bidder. Bids shall be submitted on the printed forms, or exact copies thereof, contained in the Contract Documents.

Each bid shall be accompanied by a bid bond of five percent (5%) of the bid executed by a surety company licensed under the laws of North Carolina to execute the Contract in accordance with the bid bond and upon failure to forthwith make payment, the surety shall pay the obligee an amount equal to the amount of said bond. Said deposit shall be retained by the Owner as liquidated damages in event of failure of the successful bidder to execute the Contract within ten (10) days after the Notice of Award or give satisfactory surety as required by law.

Performance and Payment Bonds are required in the amount of 100% of the Contract amount and shall be furnished by the Contractor.

All Contractors are notified that North Carolina Statutory provisions as to licensing of Contractors will be followed as applicable in receiving and evaluating bids and in reading and awarding the Contract (Chapter 87 of the North Carolina General Statutes).

The license classification shall be:

Part 1:	Public Utilities (Water and Sewer)	-	Unlimited
	Unclassified	-	Unlimited

Plans and Specifications including Contract Documents will be available online for viewing and downloading on or about **Friday, June 16, 2023** on the PWC Procurement website at https://www.faypwc.com/purchasing. In addition, the documents will be available from the Fayetteville State University Construction Resource Office (FSU CRO) at https://www.uncfsu.edu/academics/colleges-schools-and-departments/broadwell-college-of-business-and-economics/outreach-centers/construction-resource-office. In collaboration with the North Carolina Institute of Minority Economic Development, the FSU CRO offers services and support to help small, minority, veteran, and women-owned businesses identify and compete for construction-related projects.

At the FSU CRO, potential bidders may:

- Research, view and print project drawings to scale free of charge;
- Use available software to prepare their bid; and
- Receive certification and pre-qualification assistance.

Please email the FSU CRO to make an appointment: fsucro@uncfsu.edu

Plans and Specifications are also being furnished to ISQFT (www.isqft.com) for online posting. Purchase of the documents is not required to bid.

Fayetteville Public Works Commission reserves the right to reject any or all bids for any reason determined by PWC to be in its best interest, or to award the bid to the lowest responsible bidder or bidders, taking into consideration quality, performance, and the time specified in the bids for the performance of the contract.

The bidder to whom the contract may be awarded must comply fully with the requirements of North Carolina General Statutes Section 143-129, as amended.

No bids may be withdrawn after the scheduled Bid Opening for a period of ninety (90) calendar days.

FAYETTEVILLE PUBLIC WORKS COMMISSION
Candice S. Kirtz
Director of Supply Chain

DIVISION I
GENERAL REQUIREMENTS

00100 – INSTRUCTIONS TO BIDDERS

A. DEFINED TERMS

Terms used in these Instructions to Bidders are defined in 00600 Definitions and Terminology below. The term "Successful Bidder" means the lowest, responsive, responsible Bidder to whom the Fayetteville Public Works Commission ("Owner" or "PWC" or "Public Works Commission") makes an award.

B. GENERAL

Sealed Bids, in accordance with the Bidding Documents, will be received in person or via special courier service or U.S. Postal Service, at the offices of PWC's Procurement Department, 1st Floor, PWC Administration Building, 955 Old Wilmington Road, Fayetteville, North Carolina, 28301, no later than the time and date specified in the Invitation to Bid.

1. In the solicitation or awarding of contracts, the Owner shall not discriminate because of the race, religion, color, sex, age, disability or national origin of the Bidder.

2. The Owner welcomes and encourages the participation of minority-owned businesses (refer to Paragraph R of these Instructions to Bidders) in procurement transactions made by the Owner.

C. COPIES OF BIDDING DOCUMENTS

1. Complete sets of Bidding Documents and Supplementary Project Information in the number and for the sum as stated in the Invitation to Bid, may be obtained from the Owner.

2. Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Design Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

D. CONTRACTOR'S LICENSE

1. No General Contractor shall engage in contracting work in the State of North Carolina unless it has been licensed in accordance with the North Carolina statutes.

2. Bidders are prohibited from contracting for, or bidding upon, the construction, removal, repair, or improvements to or upon real property owned, controlled, or leased by the City of Fayetteville without a North Carolina contractor's license.

3. Each bidder shall indicate its North Carolina contractor's license number on the bid envelope and the Bid Form.

4. License Classification shall be:

Public Utilities Water and Sewer Unlimited

E. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

1. Before submitting a Bid, each Bidder shall (a) examine the Contract Documents thoroughly, (b) visit the site and familiarize itself with the site and local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize itself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) give the PWC Procurement Manager written notice of all conflicts, errors or discrepancies in the Contract Documents.

2. Bidder should consult the Specifications for the identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or reports that otherwise may affect cost, progress, or performance of the Work which may have been utilized by Design Engineer in preparation of the Drawings and Specifications. Owner will make copies of such reports if available at the cost (non-refundable) of reproduction to any Bidder requesting them. These reports are not intended to constitute any explicit or implicit representation as to the nature of the subsurface and latent physical conditions, which may be encountered at the site or to constitute explicit or implicit representations as to any other matter, contained in any report. Such reports are not guaranteed as to accuracy or completeness and are not part of the Contract Documents. Before submitting its bid each Bidder will, at its own expense, make such investigations and tests as the Bidder may deem necessary to determine its Bid for performance of the Work in accordance with the Contract Documents.

3. On request, the Owner will provide each Bidder access to the site to conduct such investigations and tests on request 48 hours in advance, as each Bidder deems necessary for submission of its Bid.

4. The lands upon which the Work is to be performed, right-of-way for access thereto, and other lands available for use by the Contractor in performing the Work are identified in the Contract Documents.

5. The submission of a Bid constitutes an incontrovertible representation by the Bidder that it has complied with every requirement of this Section and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

F. INTERPRETATIONS AND ADDENDA

1. All questions about the meaning or intent of the bid or Contract Documents shall be submitted in writing to Tanya Hazlett, Procurement Advisor, via email to tanya.hazlett@faypwc.com. In order to receive consideration, questions must be received by Owner no later than 5:00 PM, Thursday, June 29, 2023. Any interpretations of questions so raised, which in the opinion of the Project Engineer require interpretations, will be issued by Addenda mailed or delivered to all parties recorded by Owner and/or Design Engineer as having received the Contract Documents, not later than one (1) day prior to receipt of Bids. An Addendum extending the date for the receipt of Bids or an Addendum withdrawing the Invitation to Bid may be issued any time prior to the date set for the receipt of Bids. Owner and Design Engineer will not be responsible for oral interpretations or clarifications,

which anyone presumes to make on their behalf. **Bidders are expressly prohibited from contacting any PWC official or employee associated with this project, except as noted above. Violation of this prohibition is grounds for the immediate disqualification of the bidder.**

2. The Owner may issue such additional Addenda as may be necessary to clarify, correct or change the Contract Documents. Such Addenda, if any, will be issued in the manner and within the time stated in Paragraph 1 of this Section.

3. Each Bidder shall be responsible for determining that all Addenda issued by the Owner have been received before submitting a Bid for the Work.

4. Each Bidder shall acknowledge the receipt of each Addendum on the Bid Form.

G. **TAXES**

1. The Successful Bidder shall pay all county, city, state and federal taxes required by laws in effect at the time Bids are received and resulting from the Work or traceable thereto, under whatever name levied.

2. Said taxes shall not be in addition to the contract price between the Owner and the Successful Bidder, as the taxes shall be an obligation of the Successful Bidder and not of the Owner, and the Owner shall be held harmless from same by the Successful Bidder.

H. **SUBMISSION OF BIDS**

1. All Bidders shall use the enclosed Bid Forms, or exact copies thereof, in submitting their bid prices. The Owner will not accept oral Bids or Bids received by telephone, or Telecopier (FAX machine) for this Bid.

2. All prices must be F.O.B. delivered to the point as indicated by this Bid. The Owner will grant no allowance for boxing, crating, or delivery unless specifically provided for in this Bid.

3. The Bid Form must be completed in blue or black ink or by typewriter. Discrepancies between amounts shown in words and amounts shown in figures will be resolved in favor of the amounts shown in words. Discrepancies in the multiplication of units of Work and the unit prices will be resolved in favor of the correct multiplication of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

4. Proposals sent by mail should be registered mail. The sealed Proposal, marked as indicated above, should be enclosed in an additional sealed envelope similarly marked and addressed to:

SEALED BID: BIG ROCKFISH CREEK OUTFALL CONTRACT II
Fayetteville Public Works Commission
Attn: Procurement Department
Tanya Hazlett, Procurement Advisor
955 Old Wilmington Road
Fayetteville, North Carolina 28301

5. Mark envelope in the lower left-hand corner with the project title, hour and due date of Bid, and the Bidder's North Carolina contractor registration number.

6. Bids sent by mail and arriving after the time for opening of Bids shall not be considered as valid Bids. In such instances, the Bidders shall have no claim against the Owner.

7. All items contained in the Bid Proposal Checklist (Section 00300 Contract Forms) shall be completely filled out and submitted with the bid. Failure to submit any of the items requested with the Bid Form may be just cause for rejection of the Bid by Owner.

8. All erasures, insertions, additions, and other changes made by the Bidder to the Bid Form shall be signed or initialed by the Bidder. Bids containing any conditions, omissions, erasures, alterations, or items not called for in the Bid, may be rejected by the Owner as being incomplete or nonresponsive.

9. The Bid Form must be signed in order to be considered. If the Bidder is a corporation, the Bid must be submitted in the name of the corporation, not simply the corporation's trade name. In addition, the Bidder must indicate the corporate title of the individual signing the Bid.

10. The Bid Form, the Bid security, if any, and any other documents required, shall be enclosed in a sealed opaque envelope. Any notation or notations on the exterior of the envelope purporting to alter, amend, modify, or revise the bid contained within the envelope shall be of no effect and shall be disregarded.

11. All Bids received in the Procurement Department by the deadline indicated will be kept in a locked box until the time and date set for the opening of Bids.

12. All late Bids shall be returned unopened to the sender. Regardless of the bidder's chosen means of delivery, a bidder assumes responsibility for delivery to the advertised location by the advertised deadline. If the delivery service cannot deliver the bid to the proper location by the deadline, the bid must be rejected as untimely, and shall be returned unopened to the sender.

13. By submitting a Bid, Bidder certifies, represents, and warrants that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in any transaction, contract, or other procurement by, or otherwise excluded from or ineligible for participation to submit a bid to, any governmental department or agency. This certification is a material representation of fact upon which reliance will be placed when, if applicable, PWC executes a Contract for the Project. If it later determined that Bidder rendered an erroneous certification, in addition to any other remedy available to PWC, PWC may terminate the Contract, as applicable, for default by Bidder. If Bidder cannot certify this statement, a written explanation must be attached to the Bid for review by PWC.

I. **BID SECURITY**

1. Each Bid shall be accompanied by Bid security in the form of either a cashier's or certified check or an acceptable Bid Bond in the amount of five percent (5%) of the Bid amount, and made payable to the “Fayetteville Public Works Commission”.

2. The Bid security is a guarantee that if the contract is awarded by the Owner to the Bidder, the Bidder shall enter into the contract with the Owner for the work referenced in its Bid or forfeit the Bid security to the Owner, not as a penalty, but as liquidated damages.

3. No forfeiture under a Bid security shall exceed the lesser of (a) the difference between the Bid for which the Bid security was written and the next low Bid of another Bidder, or (b) the face amount of the Bid security.

4. All bonds shall be executed by a surety company selected by the Bidder, which is legally authorized to do business in the State of North Carolina (NCGS §44 A-26), and the bond shall be the same in both form as well as substance as AIA Document A310, Bid Bond.

5. The Bidder shall require the attorney-in-fact, who executed the required bond on behalf of the surety company, to affix thereto a certified and current copy of the power of attorney.

6. The bond premium shall be paid by the Bidder and the cost shall be included in the Bid price.

7. Any inspection of procurement transaction records shall be subject to reasonable restrictions to ensure the security and integrity of the records.

J. **MODIFICATION OF BIDS**

1. A Bid may be modified or withdrawn by the Bidder any time prior to the time and date set for the receipt of Bids. The Bidder shall notify the PWC Procurement Department in writing of its intentions.

2. Modified and withdrawn Bids may be resubmitted to the PWC Procurement Department up to the time and date set for the receipt of Bids.

K. **SUBSTITUTE MATERIAL AND EQUIPMENT**

1. The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or required in the Specifications without consideration of possible substitute or "or-equal" items. The procedure for submittal of substitute or “or-equal” items for consideration is set forth in the General Conditions.

L. **SUBCONTRACTORS**

1. Contractor shall subcontract no more than forty-nine percent (49%) of the value of the Contract.

2. Each Bidder shall submit to Owner with its bid the List of Subcontractors, Suppliers, other persons, and organizations proposed for those portions of the Work for which such identification is required. If Owner after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, Owner may, before Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute without an increase in the Bid.

3. If the apparent Successful Bidder declines to make such a substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, and other persons, and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the bid security of any Bidder. Any Subcontractor, Supplier, other person, or organization listed and to whom the Owner or, does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner, subject to revocation as provided in the General Conditions.

M. **OPENING OF BIDS**

1. Bids will be opened publicly and read aloud on the date set for the receipt of Bids in the Invitation to Bid.

2. Any Bidder, upon request, shall be afforded the opportunity to inspect Bid records within a reasonable time after the opening of all Bids but prior to award, except in the event that the Owner decides not to accept any of the Bids and to reopen the contract. Otherwise, Bid records shall be open to public inspection only after award of the Contract.

3. Any inspection of procurement transaction records shall be subject to reasonable restrictions to ensure the security and integrity of the records.

N. **WITHDRAWAL OF BID DUE TO ERROR**

1. If the Bidder desires to withdraw its proposal, the Bidder must do so before the time fixed for the opening, without prejudice by communicating its purpose in writing to the Owner, and when reached it shall be handed to it or to its authorized agent unread. After bids are open, bids may only be withdrawn in strict accordance with N.C.G.S. Section 143-129-1.

O. **BIDS TO REMAIN OPEN**

1. All Bids shall remain open for 150 days after the day of the Bid Opening.

2. Bidders are noted to review the provisions of the Davis Bacon Act and requirements and wage determination. The most current wage determination is January 1, 2023 unless otherwise posted by the United States Department of Labor or North Carolina law. The wage determination incorporated into this bid solicitation and related contract award establishes the minimum wage rates and fringe benefits which must be paid for the entire term of the

contract. In the event the contract is not awarded within a 150-day limit from the date of bid opening, and a new wage determination has been made that increases the minimum wage rates and fringe benefits, the Contractor shall be entitled to request a change in price consistent with Section 0700, General Conditions Part 10. The Contractor must document that its original bid contained proper minimum wages and benefits with the original wage determination that prevailed at time of bid.

P. AWARD OF CONTRACT

1. Owner reserves the right to reject any and all Bids, to waive any and all informalities, and to disregard all nonconforming, nonresponsive or conditional Bids.

2. In case of a tie Bid, the tie shall be decided by lot.

3. It is the intent of PWC to recommend the award of this contract to the lowest responsive, responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. In determining the lowest responsible Bidder, the Owner may consider, among other things, the Bidder's past performance, referenced projects, and other information provided by the Bidder or reference checks as noted below.

4. In determining the lowest responsive Bidder, PWC will evaluate the Bidder's proposed Contract Price and whether the submitted bid meets the requirements established in the Contract Documents and under applicable North Carolina law.

5. In awarding the Contract Owner may consider the operating costs, maintenance considerations, performance date, and guarantees of materials and equipment.

6. Owner may conduct such investigations as it deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of the Bidders, as well as other considerations, to include but not limited to resources available to the Bidder to perform the work effectively, proposed Subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

7. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

8. If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within 150 days after the day of the Bid Opening.

9. The Bidder to whom the contract is awarded shall, within ten (10) days after prescribed documents are presented for signature, execute and deliver to the Owner the Contract Documents and any other forms or bonds required by the Contract Documents.

10. The Bidder is required to complete the attached forms that will allow the Owner to verify that the Bidder is qualified to perform the Work described in these Contract Documents. **All forms shall be completed and submitted with the Bid.** Failure to submit all the required forms shall be considered grounds for the Owner to reject the bid.

The Owner will review all of the bids and qualification data to determine the lowest responsive, responsible Bidder. The Owner reserves the right to not award the Contract to the lowest bidder if the information provided is not complete, does not meet the satisfaction of the Owner, or has been falsified. The Owner will not request any additional information in order to allow the Contractor to complete bid.

11. During the evaluation phase, bid proposals will be reviewed to ascertain which proposals technically and otherwise address all the requirements of these Contract Documents. Proposals determined to be technically non- responsive or not sufficiently responsive may be disqualified.

    The Bidder shall address each of the Evaluation Criteria as requested in the Technical Evaluation Criteria Form located within Section 00300 Bid Forms. To be considered substantive, the information must respond to all requirements.

12. The Owner may conduct such investigations/verifications as deemed necessary to establish the responsibility, qualification and financial ability of the Bidder. Should the Owner adjudge that the apparent low bidder is not the lowest responsive, responsible bidder by virtue of the information furnished, said apparent low bidder will be so notified and its bid security shall be returned without prejudice. Failure or refusal to furnish any items of information requested by the Owner shall be considered as non-responsive and therefore basis for rejection of the bid.

Q. **PERFORMANCE AND OTHER BONDS**

1. The General Conditions set forth Owner's requirements as to Performance and other Bonds.

R. **Disadvantaged Business Enterprise Program**

1. See: DWI Requirements (Section A: General)

2. Bidder shall submit, with its Proposal, all documentation requested in the Contract Documents. A mandatory Pre-Bid Conference will be held as important information will be reviewed during the meeting. Failure to submit proper documentation may result in disqualification of the proposal. Questions regarding disadvantaged business requirements shall be directed to Nikole Bohannon, Small Local Program Manager, at (910) 223- 4016 / nikole.bohannon@faypwc.com.

S. **E-Verify**

Contractor hereby acknowledges that “E-Verify” is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution

of this Agreement that Contractor complies with the requirements of Article 2, Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

T. **IRAN DIVESTMENT ACT**

1. As mandated by N.C.G.S. §147-86.59(a), Contractor hereby certifies that it is not listed on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. §147-86.58. Contractor further certifies that in accordance with N.C.G.S. §146-86.58(b) that it shall not utilize any subcontractor found on the State Treasurer's Final Divestment List. Contractor certifies that the signatory to this Purchase Order authorized by the Contractor to make the foregoing statement.

*** END OF SECTION ***

SECTION A – PROJECT SPECIFICS
BID SUBMITTAL DOCUMENTS

BID SCHEDULE – PERFORMANCE AND DELIVERY
FAYETTEVILLE PUBLIC WORKS COMMISSION
BIG ROCKFISH CREEK OUTFALL CONTRACT II

Virtual Pre-Bid Meeting:	2:00, Tuesday, June 22, 2023
(MANDATORY)	Via Microsoft Teams
Deadline for Questions from Bidders[1]	5:00 p.m., Thursday, June 29, 2023
Deadline for Addenda issued by PWC Procurement Department and Project Engineer[2]	5:00 p.m., Thursday, July 6, 2023
Bid Opening (Submittal Deadline)	2:00, Tuesday, July 18, 2023 Fayetteville Public Works Commission Administrative Building Conference Room 107 955 Old Wilmington Road Fayetteville, NC 28301
Contract Time:	**670** Calendar Days from NTP for Final Completion (Construction from Station 116+88.01 to Station 228+63.93-Big Rockfish Creek Outfall and Station 0+00 to Station 8+49.76-Camden Glen/Peartree Estates Outfall Connector)
Liquidated Damages:	$1,500 per calendar day for Project in its entirety
Bid Acceptance Period	One hundred twenty (150) Calendar Days unless otherwise noted

1. Questions regarding this bid must be submitted in writing to the attention of Tanya Hazlett, Procurement Advisor, by email to tanya.hazlett@faypwc.com.

   Bidders are expressly prohibited from contacting any FPWC official or employee associated with this Invitation to Bid, except as noted above. Violation of this prohibition is grounds for the immediate disqualification of the bidder.

2. Any addenda to these Contract Documents will be issued by the Project Engineer no later than the date and time stated above.

BID SUBMITTAL CHECKLIST

- ☐ 1. Enter Contractor's License Number where called for in the Bid Form and on the outside of the sealed envelope containing the Bid.
- ☐ 2. Photocopy of Contractor's License.
- ☐ 3. Bid Bond
- ☐ 4. Bid Forms Section 00300.
- ☐ 5. Provide the responsible North Carolina Registered Agent for Insurance Claims. Include contact information.
- ☐ 6. Provide the proposed responsible Bonding Company name. Include contact information.
- ☐ 7. List of proposed Subcontractors and material suppliers exceeding 5% of the Contract Value.
- ☐ 8. Non-Collusive Affidavit.
- ☐ 9. Nondiscrimination Clause.
- ☐ 10. Affidavit of Organization and Authority and Sworn Statement.
- ☐ 11. Equal Employment Opportunity Acknowledgment.
- ☐ 12. Certification regarding Debarment, Proposed Debarment, and other Responsible Matters.
- ☐ 13. FTA Certification Regarding Lobbying.
- ☐ 14. NC DWI MBE/WBE (DBE) Compliance Supplementals and Attachments
- ☐ 15. SLS Disclosure Form.
- ☐ 16. The Completed Contractor Qualification Form.

FAILURE TO SUBMIT THE ABOVE FORMS WITH THE BID FORM MAY BE JUST CAUSE FOR REJECTION OF THE BID BY THE OWNER

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00300 - BID FORM

TO: **Fayetteville Public Works Commission**
Attn: Tanya Hazlett, Procurement Advisor
955 Old Wilmington Road
Fayetteville, North Carolina 28301

PROJECT: **BIG ROCKFISH CREEK OUTFALL CONTRACT II**

FROM: BIDDER _____

ADDRESS _____

_____

DATE OF BID _____ , 20 ____

A. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into a Contract with OWNER in the form included in the Contract Documents to perform and furnish all Work (as that term is defined in the Construction Agreement) specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

B. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including, without limitation, those dealing with the disposition of payment and performance bonds, and insurance certificates. This bid will remain open for one hundred fifty (150) calendar days after the day of Bid opening. BIDDER will sign the Contract and submit the Contract Security and other documents required by the Contract Documents within ten (10) days after the date of receipt by the BIDDER.

C. In submitting this Bid, Bidder represents, as more fully set forth in the Contract, that:

1. BIDDER has examined copies of all the Contract Documents and of the following addenda, receipt of all which is acknowledged on the bid summary page:

2. BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress of performance of the work and has made such independent investigations as BIDDER deems necessary.

3. BIDDER acknowledges that OWNER does not assume responsibility for the accuracy of dimensions or completeness of information and data shown or indicated in the Bidding Documents with respect to existing facilities.

4. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site of the Work (expect underground facilities) and all drawings of physical conditions in or relating to existing surface or

subsurface structures, pipelines, and utilities at or contiguous to the site are provided within these Contract Documents. Geotechnical Reports and other information regarding subsurface conditions are identified in the attached appendices and detailed in Article V of the PWC General Conditions. BIDDER acknowledges that the OWNER does not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to underground facilities at or contiguous to the site of Work. BIDDER had obtained and carefully studied (or assumes responsibility for have done so) all such additional or supplementary examinations investigations, explorations, tests, studies, and data that are necessary to identify and understand conditions (surface, subsurface, and underground facilities) at or contiguous to the site of Work or otherwise which may affect cost, progress, performance, or furnishing the Work or which relate to any aspect of means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. BIDDER waives all rights to claim that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the proper submission of the Bid for the performance and furnishing of the Work in accordance with the Contract Time, Contract Price, and other terms and conditions of the Contract Documents.

5. BIDDER hereby certifies that, if awarded the Contract for construction of the Project, it will take all possible actions to minimize costs to the OWNER which are related to any disruptions in any part of the Work resulting from unforeseeable conditions which may be encountered and work changes or additions which may be made.

6. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, exploration, tests, studies, and data with the Contract Documents.

7. BIDDER has given OWNER written notice of all conflicts, errors, ambiguities, or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

8. By bidding in response to this invitation, the BIDDER represents that in the preparation and submission of this Bid, said BIDDER did not, either directly or indirectly, enter into any combination or arrangement with any person, firm or corporation or enter into any agreement, participate in any collusion, or otherwise take any action in the restraint of free, competitive bidding in violation of the Sherman Act (15 U.S.C. Section 1).

9. Bid form must be completed in blue or black ink or by typewriter. The Bid price of each item on the form must be stated in both words and numerals. In case of a

conflict, words shall take precedence. Discrepancies in the multiplication of units of work and unit prices will be resolved in favor of the correct multiplication of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

10. BIDDER understands that the award of contract will be made on the basis of the total Bid amount which will be determined as the sum of the unit price and lump sum Bid Items.

11. BIDDER understands that quantities are estimated and are not guaranteed; they are solely for comparing Bids and establishing the total Bid amount. The Price will be modified by Change Order, and final payment will be based on the quantities of work actually furnished and installed by the successful BIDDER.

12. BIDDER shall complete the Work for the prices indicated on the next page.

- BID SUMMARY-

BASE BID, PART A - Big Rockfish Creek Sanitary Sewer Outfall (Station from Sta. 116+89 to Sta. 264+64)

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
SITE PREPARATION & ALLOWANCES						
1	1	Mobilization (less than or equal to 3% of Part A Bid) @_____lump sum	LS	1	$	$
2	2	Traffic Control & Traffic Control Plan @_____lump sum	LS	1	$	$
3	3	Allowance for "Third Party" Vibration Monitoring @_____lump sum	LS	1	$ 50,000.00	$ 50,000.00
SANITARY SEWER MAIN INSTALLATION						
4	7	Furnish and Install PVC SDR-26 (Pipe Stiffness 115) Sewer Pipe (Open Trench)				
		18-inch Sanitary Sewer				
4-a		8' - <10' Depth @_____per linear foot	LF	141	$	$
4-b		10' - <12' Depth @_____per linear foot	LF	140	$	$
4-c		12' - <14' Depth @_____per linear foot	LF	130	$	$
4-d		14' - <16' Depth @_____per linear foot	LF	303	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
4-e		16' - <18' Depth @_____per linear foot	LF	529	$	$
4-f		18' - <20' Depth @_____per linear foot	LF	186	$	$
4-g		20' - <22' Depth @_____per linear foot	LF	40	$	$
5	7	Furnish and Install PVC SDR-26 (Pipe Stiffness 115) Sewer Pipe **(Open Trench)**				
		24-inch Sanitary Sewer				
5-a		8' - <10' Depth @_____per linear foot	LF	233	$	$
5-b		10' - <12' Depth @_____per linear foot	LF	679	$	$
5-c		12' - <14' Depth @_____per linear foot	LF	773	$	$
5-d		14' - <16' Depth @_____per linear foot	LF	609	$	$
5-e		*16' - <18' Depth* @_____*per linear foot*	*LF*	*260*	$	$
5-f		*18' - <20' Depth* @_____*per linear foot*	*LF*	*365*	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
5-g		20' - <22' Depth @_____per linear foot	LF	166	$	$
5-h		22' - <24' Depth @_____per linear foot	LF	30	$	$
6	8	Furnish and Install C900 PVC DR-18 Sewer Pipe (Open Trench)				
		18-inch Sanitary Sewer				
6-a		0' - <8' Feet Depth @_____per linear foot	LF	213	$	$
6-b		8' - <10' Depth @_____per linear foot	LF	323	$	$
6-c		10' - <12' Depth @_____per linear foot	LF	586	$	$
6-d		12' - <14' Depth @_____per linear foot	LF	272	$	$
6-e		14' - <16' Depth @_____per linear foot	LF	325	$	$
6-f		16' - <18' Depth @_____per linear foot	LF	91	$	$
7	8	Furnish and Install C900 PVC DR-18 Sewer Pipe (Open Trench)				
		24-inch Sanitary Sewer				
7-a		10' - <12' Depth @_____per linear foot	LF	193	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
7-b		12' - <14' Depth @_____per linear foot	LF	2,162	$	$
7-c		14' - <16' Depth @_____per linear foot	LF	380	$	$
7-d		16' - <18' Depth @_____per linear foot	*LF*	*282*	$	$
7-e		18' - <20' Depth @_____per linear foot	*LF*	*213*	$	$
7-f		20' - <22' Depth @_____per linear foot	LF	734	$	$
7-g		22' - <24' Depth @_____per linear foot	LF	205	$	$
7-h		24' - <26' Depth @_____per linear foot	LF	25	$	$
8	8	Furnish and Install Restrained Joint C900 PVC DR-18 Sewer Pipe (Open Trench)				
		24-inch Sanitary Sewer				
8-a		12' - <14' Depth @_____per linear foot	LF	695		
8-b		14' - <16' Depth @_____per linear foot	LF	330		
8-c		16' - <18' Depth @_____per linear foot	LF	638		

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
8-d		18' - <20' Depth @_____per linear foot	LF	364		
8-e		20' - <22' Depth @_____per linear foot	LF	248		
8-f		22' - <24' Depth @_____per linear foot	LF	79		
9	9	Furnish and Install Epoxy-Lined Class 250 Ductile Iron Sewer Pipe (Open Trench)				
		18-inch DIP Sanitary Sewer				
9-a		0' - <8' Depth @_____per linear foot	LF	121	$	$
9-b		8' - <10' Depth @_____per linear foot	LF	120	$	$
9-c		10' - <12' Depth @_____per linear foot	LF	33	$	$
9-d		12' - <14' Depth @_____per linear foot	LF	44	$	$
9-e		14' - <16' Depth @_____per linear foot	LF	17	$	$
10	9	Furnish and Install Epoxy-Lined Class 250 Ductile Iron Sewer Pipe (Open Trench)				
		24-inch DIP Sanitary Sewer				
10-a		0' - <8' Depth @_____per linear foot	LF	93	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
10-b		8' - <10' Depth @_____per linear foot	LF	187	$	$
10-c		14' - <16' Depth @_____per linear foot	LF	54	$	$
10-d		16' - <18' Depth @_____per linear foot	LF	96	$	$
11	10	Furnish and Install Class 250 Restrained Joint Epoxy-Lined Ductile Iron Sewer Pipe (Open Trench)				
		24-inch DIP Sanitary Sewer				
11-a		12' - <14' Depth @_____per linear foot	LF	36	$	$
11-b		14' - <16' Depth @_____per linear foot	LF	372	$	$
11-c		16' - <18' Depth @_____per linear foot	LF	40	$	$
11-d		20' - <22' Depth @_____per linear foot	LF	4	$	$
11-e		22' - <24' Depth @_____per linear foot	LF	12	$	$
12	11	Furnish Steel Encasement Pipe installed by Guaranteed Encased Trenchless Crossing with RJ Epoxy lined DIP Class 250 Sanitary Sewer Carrier Pipe				
12-a		54-inch Steel Encasement Pipe installed by Guaranteed Trenchless Crossing with 24-inch Sanitary Sewer Carrier Pipe @_____per linear foot	LF	626	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
13	13	Furnish and Install Sewer Service Lateral				
13-a		PVC Sewer Service Lateral, 6-inch Diameter @_____per each	EA	2	$	$
SANITARY SEWER MANHOLES						
14	15	Furnish and Install Precast Concrete Manhole				
		Furnish and Install 4' Dia. Precast Concrete Manhole, Non-Traffic, CamLock Ring and Cover				
14-a		8' - <10' Feet Depth @_____each	EA	3	$	$
14-b		12' - <14' Depth @_____each	EA	2	$	$
14-c		14' - <16' Depth @_____each	EA	4	$	$
14-d		16' - <18' Depth @_____each	EA	5	$	$
15	15	Furnish and Install 5' Dia. Precast Concrete Manhole, Non-Traffic, CamLock Ring and Cover				
15-a		10' - <12' Depth @_____each	EA	1	$	$
15-b		12' - <14' Depth @_____each	EA	4	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
15-c		14' - <16' Depth @_____each	EA	1	$	$
15-d		16' - <18' Depth @_____each	EA	1	$	$
15-e		18' - <20' Depth @_____each	EA	1	$	$
15-f		20' - <22' Depth @_____each	EA	2	$	$
15-g		22' - <24' Depth @_____each	EA	1	$	$
15-h		24' - <26' Depth @_____each	EA	1	$	$
16	15	Furnish and Install 5' Dia. Precast Concrete Manhole, Traffic, Standard Ring and Cover				
16-a		8' - <10' Depth @_____each	EA	4	$	$
16-b		10' - <12' Depth @_____each	EA	5	$	$
16-c		12' - <14' Depth @_____each	EA	9	$	$
16-d		14' - <16' Depth @_____each	EA	4	$	$
16-e		16' - <18' Depth @_____each	EA	7	$	$

16-f		20' - <22' Depth @_____each	EA	1	$	$
16-g		22' - <24' Depth @_____each	EA	2	$	$
17	15	Furnish and Install 5' Dia. Precast Concrete Manhole, Traffic, CamLock Ring and Cover				
17-a		10' - <12' Depth @_____each	EA	1	$	$
17-b		12' - <14' Depth @_____each	EA	2	$	$
17-c		14' - <16' Depth @_____each	EA	2	$	$
17-d		16' - <18' Depth @_____each	EA	2	$	$
17-e		20' - <22' Depth @_____each	EA	1	$	$
18	17	Furnish and Install Standard Manhole Vents @_____each	EA	9	$	$
19	18	Connect To Existing Manhole				
19-a		24-inch Diameter (Approx. Stat. 116+90, SSMH 45) @_____each	EA	1	$	$
20	16	Furnish and Install Inside Drop				
20-a		Interior Drop Structure for Sewer Service Lateral, 6-inch Diameter @_____per vertical foot	VF	10	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
21	20	Furnish and Install Anti-Microbial Admixture, Cementitious Base Coating and Polymeric Lining				
21-a		4-foot Inside Diameter @_____per vertical foot	VF	22	$	$
21-b		5-foot Inside Diameter @_____per vertical foot	VF	285	$	$
22	19	Furnish and Install Manhole Insert Odor Control @_____each	EA	3	$	$
EROSION AND SEDIMENTATION CONTROL						
23	21	Furnish and Install Erosion and Sedimentation Control Devices @_____lump sum	LS	1	$	$
24	22	Furnish and Install Anti-Seepage Collars				
24-a		Compacted Clay on 18" C900 PVC @_____each		10	$	$
24-b		Compacted Clay or Placed Concrete on 18" DIP @_____each		1	$	$
24-c		Compacted Clay on 24" C900 PVC @_____each		19	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
25	23	Convert Temporary Construction Entrance to Permanent Access @_____each	EA	3	$	$
26	24	Furnish and Install Temporary Stream Crossing				
26-a		Stream S7 @_____each	EA	1	$	$
26-b		Stream S8 @_____each	EA	1	$	$
26-c		Stream S10 @_____each	EA	1	$	$
27	25	Furnish and Install Temporary Wetland Crossing				
27-a		Wetland 1/A @_____each	EA	1	$	$
27-b		Wetland 2 @_____each	EA	1	$	$
27-c		Wetland 18 @_____each	EA	1	$	$
27-d		Wetland 26 @_____each	EA	1	$	$
27-e		Wetland 27 @_____each	EA	1	$	$
27-f		Wetland 28 @_____each	EA	1	$	$
27-g		Wetland 29 @_____each	EA	1	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
27-h		Wetland B @_____each	EA	1	$	$
27-i		Wetland C @_____each	EA	1	$	$
28	26	Sod Grass Installation (Between Lakeview Drive and Camden Road) @_____per square foot	SF	296,510	$	$
29	27	Permanent Seeding (Contract 2 Beginning to Lakeview Drive and Camden Road to Contract 2 End)				
29-a		Non-wetland Areas @_____per square foot	SF	153,920	$	$
29-b		Wetland Areas @_____per square foot	SF	151,905	$	$
INCIDENTALS, DEMOLITION AND RESTORATION						
30	29	Reconstruct NCDOT Maintained Residential Street (NOA)				
30-a		Lakeview Drive @_____per square yard	SY	4,400	$	$
30-b		Lake Farm Road @_____per square yard	SY	1,250	$	$
30-c		Mariner's Landing Drive @_____per square yard	SY	6,250	$	$
31	30	Mill and Overlay @_____per square yard	SY	1,155	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
32	32	Dirt Road Repair @_____per square yard	SY	1,195	$	$
33	33	Removal and Replacement of Concrete @_____per square yard	SY	915	$	$
34	31	Gravel Driveway Repair @_____per square yard	SY	287	$	$
35	38	Removal and Replacement Drainage Pipe				
35-a		15-inch Diameter Reinforced Concrete Pipe @_____per linear foot	LF	560	$	$
35-b		18-inch Diameter Reinforced Concrete Pipe @_____per linear foot	LF	48	$	$
35-c		24-inch Diameter Reinforced Concrete Pipe @_____per linear foot	LF	144	$	$
35-d		48-inch Diameter Corrugated Plastic Pipe @_____per linear foot	LF	52	$	$
36	34	Undercut Pipe Trench and Replacement with No. 57 or 67 Stone for Pipe Foundation @_____per cubic yard	CY	1,000	$	$
37	35	Removal of Unsuitable Material Excavation and Backfill with Select Material @_____per cubic yard	CY	27,000	$	$
38	36	Rock Excavation and Replacement with Select Backfill @_____per cubic yard	CY	150	$	$

Item No.	Spec. 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
39	37	Maintenance Stone (No Overage Allowed) @_____per square yard	SY	11,930	$	$
40	45	Replacement of Existing Water Service Connection (AQUA) @_____each	EA	22	$	$
41	39	*Hydrostatic Pressure Testing of New 24-inch Sewer Pipe at Aerial Pipes, Pipes Near Private Wells and Pipes Crossing Wetlands* *@_____per linear foot*	*LF*	*7,171*	$	$
42	39	Hydrostatic Pressure Testing of New 18-inch Sewer Pipe at Aerial Pipes, Pipes Near Private Wells and Pipes Crossing Wetlands @_____per linear foot	LF	2,101	$	$
					Subtotal-Part A, Base Bid	**$**

PART B (Bid Add Alternate) - Peartree Estates Sanitary Sewer & Camden Glen Lift Station Connection						
SITE PREPARATION & ALLOWANCES						
Item No.	**Spec 01025 Ref. No.**	**Description**	**Unit**	**Estimated Quantities**	**Bid Unit Price**	**Bid Price**
1	1	Mobilization (less than or equal to 3% of Part B Bid) @_____lump sum	LS	1	$	$
2	2	Traffic Control & Traffic Control Plan @_____lump sum	LS	1	$	$
3	4	Lift Station Demolition - Camden Glen LS Abandonment @_____lump sum	LS	1	$	$
4	3	Allowance for "Third Party" Vibration Monitoring @_____lump sum	LS	1	$5,000.00	$5,000.00
SANITARY SEWER MAIN INSTALLATION						
5	7	Furnish and Install PVC SDR-26 (Pipe Stiffness 115) Sewer Pipe (Open Trench)				
		8-inch Sanitary Sewer				
5-a		10' - <12' Depth @_____per linear foot	LF	36	$	$
5-b		12' - <14' Depth @_____per linear foot	LF	50	$	$
5-c		14' - <16' Depth @_____per linear foot	LF	23	$	$
5-d		16' - <18' Depth @_____per linear foot	LF	20	$	$

Item No.	Spec 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
5-e		18' - <20' Depth @_____per linear foot	LF	78	$	$
5-f		20' - <22' Depth @_____per linear foot	LF	121	$	$
5-g		22' - <24' Depth @_____per linear foot	LF	52	$	$
6	10	Furnish and Install Class 250 Restrained Joint Epoxy-Lined Ductile Iron Sewer Pipe (Open Trench)				
		8-inch Sanitary Sewer				
6-a		10' - <12' Depth @_____per linear foot	LF	5	$	$
7	10	Furnish and Install Class 250 Restrained Joint Epoxy-Lined Ductile Iron Sewer Pipe (Open Trench)				
		12-inch Sanitary Sewer				
7-a		8' - <10' Depth @_____per linear foot	LF	44	$	$
7-b		10' - <12' Depth @_____per linear foot	LF	15	$	$
8	11	Furnish Steel Encasement Pipe installed by Guaranteed Encased Trenchless Crossing with RJ Epoxy lined Class 250 DIP Sanitary Sewer Carrier Pipe				

Item No.	Spec 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
8-a		36-inch Steel Encasement Pipe installed by Guaranteed Trenchless Crossing with 12-inch Sanitary Sewer Carrier Pipe @_____per linear foot	LF	411	$	$
9	12	Connect to Existing Sewer (Sheet C36A)				
9-a		8-inch Diameter @_____each	EA	1	$	$
10	14	Reconnect Existing Sanitary Sewer Service				
10-a		4" Sanitary Sewer Service @_____each	EA	1	$	$
SANITARY SEWER MANHOLES						
11	15	Furnish and Install Precast Concrete Manhole				
		Furnish and Install 4' Dia. Precast Concrete Manhole, Non-Traffic, Standard Ring and Cover				
11-a		8' - <10' Depth (Installation of Temporary Manhole - Sheet C36A) @_____each	EA	1	$	$
11-b		12' - <14' Depth @_____each	EA	1	$	$
12	15	Furnish and Install 4' Dia. Precast Concrete Manhole, Traffic, Standard Ring and Cover				
12-a		12' - <14' Depth @_____each	EA	1	$	$
12-b		18' - <20' Depth @_____each	EA	1	$	$

Item No.	Spec 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
13	15	Furnish and Install 5' Dia. Precast Concrete Manhole, Traffic, Standard Ring and Cover				
13-a		18' - <20' Depth @_____each	EA	1	$	$
13-b		22' - <24' Depth @_____each	EA	1	$	$
14	17	Furnish and Install Standard Manhole Vents @_____each	EA	1	$	$
15	16	Furnish and Install Interior Drop Structure				
15-a		8-inch Diameter @_____per vertical foot	VF	14	$	$
WATER MAIN INSTALLATION						
16	42	Remove and Replace 2-inch SDR-21 PVC Water Main @_____per linear foot	LF	40	$	$
17	44	Remove and Replace 2-inch Blow-off Assembly on SDR-21 PVC Water Main @_____each	EA	1	$	$
18	43	Furnish and Install 2-inch Ball Valve on Existing PVC Water Main (Cut-in Connection) @_____each	EA	1	$	$
19	46	Sterilization and Testing	LS	40	$	$
EROSION AND SEDIMENTATION CONTROL						

Item No.	Spec 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
20	21	Furnish and Install Erosion and Sedimentation Control Devices @_____lump sum	LS	1	$	$
21	26	Sod Grass Installation @_____per square foot	SF	18,750	$	$
INCIDENTALS, DEMOLITION AND RESTORATION						
22	28	Asphalt Pavement Patch (FAYPWC M.1&M.2) @_____per square yard	SY	115	$	$
23	30	Mill and Overlay @_____per square yard	SY	700	$	$
24	33	Concrete Curb Repair @_____per linear foot	LF	110	$	$
25	34	Undercut Pipe Trench and Replacement with No. 57 or 67 Stone for Pipe Foundation @_____per cubic yard	CY	25	$	$
26	35	Removal of Unsuitable Material Excavation and Backfill with Select Material @_____per cubic yard	CY	25	$	$
27	36	Rock Excavation and Replacement with Select Backfill @_____per cubic yard	CY	15	$	$
28	40	Remove Existing Manhole (Sheet C36A-Existing Sewer Manhole in cul de sac and Temporary Manhole) @_____each	EA	2	$	$

Item No.	Spec 01025 Ref. No.	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
29	38	Removal and Replacement Drainage Pipe				
29-a		18-inch Diameter Reinforced Concrete Pipe @_____per linear foot	LF	20	$	$
30	41	Removal and Replacement Drainage Structures				
30-a		Curb Inlet Structures (Inclusive of connecting pipe) @_____each	EA	2	$	$
					Subtotal Add Alternate Bid, Part B	**$**

PART C - Well Abandonment/Relocation

Item No.	Spec 01025 Ref. No..	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
1	C1	Mobilization (Less than or Equal to 5% of the Total Bid Price) @_____ lump sum	LS	1		
2	C2	Traffic Control & Traffic Control Plan @_____ lump sum	LS	1		
3	C3	Erosion and Sedimentation Control & Erosion and Sedimentation Control Plan @_____ lump sum	LS	1		
4	C4	Clearing & Grubbing @_____per acre	AC	1		
5	C5	Fence Removal & Replacement @_____ per linear foot	LF	308		

Item No.	Spec 01025 Ref. No..	Description	Unit	Estimated Quantities	Bid Unit Price	Bid Price
6	C6	Well Abandonment @_____each	EA	13		
7	C7	Water Supply Well System Installation @_____each	EA	13		
8	C8	Furnish & Install Well House/Pumphouse @_____each	EA	13		
9	C9	Replacement of Existing Residential Water Well Electrical Systems @_____each	EA	13		
10	C10	Well Electrical System Upfits (Allowance)	ALLOW	1	$50,000.00	$50,000.00
11	C11	Replacement of Existing Residential Water Well Plumbing Systems @_____each	EA	13		
12	C12	Furnish & Install SOD (NOA) @_____per square yard	SY	3,325		
13	C13	Gravel/Soil Driveway Restoration @_____per square yard	SY	676		
					Subtotal Base Bid, Part C	**$**
					Total Base Bid (Part A + Part C)	**$**
					Total Alternate Base Bid (Part A + Part B + Part C)	**$**

- BID SUMMARY-

TOTAL PART "A" BIG ROCKFISH CREEK SANITARY SEWER OUTFALL (STA. 116+89 TO STA. 264+64)-BASE	$_____
TOTAL PART "C" WELL ABANDONMENT/RELOCATION-BASE	$_____
TOTAL BASE BID	**$_____**
TOTAL PART "A" BIG ROCKFISH CREEK SANITARY SEWER OUTFALL (STA. 116+89 TO STA. 264+64)	$_____
TOTAL PART "B" PEARTREE ESTATES SANITARY SEWER & CAMDE GLEN LIFT STATION CONNECTION-ADD ALTERNATE	$_____
TOTAL PART "C" WELL ABANDONMENT/RELOCATION-BASE	$_____
TOTAL BASE ALTERNATE BID	**$_____**

The BIDDER has received, acknowledged, and used the following addenda in completing the Bid. (Initial and Date as appropriate).

Addendum No. 1	Date _____
Addendum No. 2	Date _____
Addendum No. 3	Date _____
Addendum No. 4	Date _____
Addendum No. 5	Date _____
Addendum No. 6	Date _____
Addendum No. 7	Date _____

The undersigned BIDDER certifies that they are licensed as a Contractor under N.C.G.S **§** 87, and that their license number is_____ (License Number).

The undersigned BIDDER hereby agrees to accept an award of the Contract based on the Total Contract Amount as accepted by the OWNER and as indicated on the Notice of Award.

A. BIDDER agrees that Work shall be completed within the time frame indicated in the Agreement as follow:

    1. All work described herein to be complete, including restoration and all punch list within 670 consecutive calendar days from the start date stipulated on Notice to Proceed.

    2. The BIDDER acknowledges that time is of the essence in this Contract and that the OWNER will suffer financial loss if the Work is not complete within the time specified in Paragraph D.1 above plus any extensions thereof allowed in accordance with these Contract Documents. BIDDER also recognizes the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by the OWNER if the Work is not complete on time. The Bidder agrees to diligently pursue all available work and complete all work in an expeditious manner.

B. The following documents are attached to and made part of this bid:

    Required Bid Security in the form of either a cashier's check or certified check or Bid Bond in the amount of 5% of maximum Bid price.

C. Communications concerning this Bid shall be addressed to: (CONTRACTOR's Name, Address and Telephone Number)

    _____
    _____
    _____
    _____
    _____

D. The terms used in this Bid which are defined in Definitions and Terminology Section of the PWC General Conditions or as otherwise specifically defined in the Contract Documents have the meanings assigned to them therein, which are incorporated by reference as if fully set forth herein.

E. An individual contractor is required to furnish his social security number and sole proprietorship, partnership and corporation are required to furnish their employer identification numbers to Fayetteville Public Works Commission. Please indicate this information on this Bid Form as follows:

    Social Security Number: _____

    Federal Employer Identification Number: _____

SUBMITTED ON ____day of_____2023

AN **INDIVIDUAL**

BY:_____(SEAL)

(Individual's Name and Signature)

Doing Business as: _____

North Carolina Contractor Registration Number:_____

Business Address:_____

Phone Number: _____

Subscribed and sworn to before me this____day of_____2023

_____

NOTARY PUBLIC

My Commission Expires: _____

_____

A **PARTNERSHIP**

BY:_____(SEAL)

(Firm Name)

(General Partner and Signature)

North Carolina Contractor Registration Number:_____

Business Address:_____

Phone Number: _____

Subscribed and sworn to before me this____day of_____2023

_____

NOTARY PUBLIC

My Commission Expires: _____

_____

A **CORPORATION**

BY: _____ _____

(Corporation Name) (State of Incorporation)

BY: _____ (SEAL)

(Name and Title of Person Authorized to Sign and Signature)

ATTEST: _____

(Secretary or Assistant Secretary and Signature)

North Carolina Contractor Registration Number: _____

Business Address: _____

Phone Number: _____

Subscribed and sworn to before me this ____ day of _____ 2023

_____

NOTARY PUBLIC

My Commission Expires: _____

_____

A **JOINT VENTURE**

BY: _____

(Name and Signature)

Doing Business as: _____

North Carolina Contractor Registration Number: _____

Business Address: _____

Phone Number: _____

Subscribed and sworn to before me this ____ day of _____ 2023

_____

NOTARY PUBLIC

My Commission Expires: _____

(Each joint venturer must sign. The name of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

CONTRACTOR QUALIFICATION FORM

******************TO BE SUBMITTED WITH BID PACKAGE******************	
TECHNICAL EVALUATION CRITERIA FORM	
PROJECT DOCUMENTATION	
(1) Permanent Name of Business:	
(2) Permanent address:	
(3) Length of Time in Business:	
(4) Has the organization operated under any other name?	
(5) State the names and/or companies financially interested in the proposal:	
(6) Within the last five (5) years, has any officer or principal of the organization ever been an officer or principal of another organization when it failed to complete a construction contract? If yes, list name(s), and responsibility.	
SEWER MAIN EXPERIENCE	
(1) List not less than three (3) completed large diameter outfall projects of similar size, scope, nature, and cost, to include the dates of such projects. Please provide all requested information for each listed project. Each project should be from separate references. List only those projects completed as Prime Contractor.	

Project 1A:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:
Project 1B:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:

Project 1C:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:
(2) A listing of three (3) large diameter sewer outfall projects of similar size, scope and cost. (Provide reference information as stated in #1.)		
Project 2A:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:
Project 2B:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:
Project 2C:		Cost:
Location:	Dates:	Size:
Scope:	Client:	Phone:
(3) List any subcontracting experience on large diameter sewer outfall projects with specifics to the type of work performed for this project. Please provide all requested information.		
Project:		Cost:
Location:	Dates:	Size:

Work Performed:		
Project:		Cost:
Location:	Dates:	Size:
Work Performed:		
Project:		Cost:
Location:	Dates:	Size:
Work Performed:		
(4) List of projects in progress. Please provide all requested information.		
Project:		Cost:
Owner:		
Percentage Complete:	Scheduled Completion Date:	
Project:		Cost:
Owner:		
Percentage Complete:	Scheduled Completion Date:	
Project:		Cost:
Owner:		

Percentage Complete:	Scheduled Completion Date:
Project:	Cost:
Owner:	
Percentage Complete:	Scheduled Completion Date:
Project:	Cost:
Owner:	
Percentage Complete:	Scheduled Completion Date:
Project:	Cost:
Owner:	
Percentage Complete:	Scheduled Completion Date:

PROJECT PERSONNEL AND EXPERIENCE	
(1) The number of crews qualified and available to perform the work stated in this proposal:	
(2) The names of Bidder superintendents and crew leaders/foreman who are qualified and available to perform the work stated in this proposal:	Superintendents:
	Crew leaders/foreman:

ADDITIONAL ITEMS
The following items shall be submitted as attachments:
(1) Affidavit stating any OSHA violations occurring within the past three (3) years.
(2) A statement provided by the Surety Company stating the Bidder's bonding limit and a statement of the amount of work currently under bond.
(3) A statement listing any judgments, claims, arbitration proceedings, or suits pending or outstanding against organization or its officers.
(4) A statement listing any filed lawsuits, judgments, claims, arbitration proceedings, or suits pending with regard to construction contracts within the last five (5) years.
(5) The resumes or brief summary of key personnel of the organization. Identify the person that will be primarily responsible for the project.
(6) List of equipment that is available for use on the subject project.

The Owner may conduct such investigations/verifications as deemed necessary to establish the responsibility, qualification and financial ability of the Bidder. Should the Owner adjudge that the apparent low bidder is not the lowest responsive, responsible bidder by virtue of the above information furnished, said apparent low bidder will be so notified and his bid security shall be returned to him without prejudice. Failure or refusal to furnish any items of information requested by the Owner shall be considered as non-responsive and therefore, basis for rejection of the bid.

Submitted By:	Date:
Printed Name:	Title:

BID BOND

This is a Bid Bond that is subject to the provisions of Article 3 of Chapter 44A of the North Carolina General statutes.

This Bond is executed on _____ , 20 _____ .

The name of the PRINCIPAL is _____ (1)

_____ (2)

The name of the SURETY is _____

_____

Fayetteville Public Works Commission, Fayetteville, North Carolina is the OWNER

The amount of the Bond is _____

_____ (Dollars) ($ _____)

KNOW BY ALL MEN BY THESE PRESENTS, the Principal and Surety above named are hereby held and firmly bound unto the above named OWNER hereinafter called the OWNER in the penal sum of the amount stated above in lawful money of the United States, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the OWNER a certain Bid, attached hereto and hereby made a part hereof to enter into a Contract in writing, for the construction of:

BIG ROCKFISH CREEK OUTFALL CONTRACT II

NOW, THEREFORE

(a) If said Bid shall be rejected, or in the alternate,

(b) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

ATTEST:

(Principal Secretary) (SEAL)	Principal
	BY: (3)
	(Address)
Witness as to Principal	Surety
(Address)	(Address)

ATTEST:

N.C. Resident Agent
(SEAL)

Witness as to Surety

(Address)

(1) Correct name of Contractor
(2) A Corporation, a Partnership or an Individual, as the case may be
(3) If Contractor is a Partnership, all partners should execute Bond

POWER OF ATTORNEY
(Attach)

AFFIDAVIT OF ORGANIZATION AND AUTHORITY SWORN STATEMENT
BIG ROCKFISH CREEK OUTFALL CONTRACT II

STATE OF _____

COUNTY OF _____

_____being the first duly sworn on oath deposes and says that the Bidder on the attached Bid Form id organized as indicated below and that all statements herein made are made on behalf of such Bidder and that this deponent is authorized to make them.

(Fill Out Applicable Paragraph)

1. CORPORATION

The bidder is a corporation organized and existing under the laws of the State of _____ and its President is_____, and its Secretary is _____, and does have a corporate seal. The _____ is authorized to sign construction Contract and Bids for the company by action of its Board of Directors taken _____, a certified copy of which is hereto attached. (Strike out last sentence if not applicable.)

2. PARTNERSHIP

The Bidder is a Partnership consisting of_____ and _____, partners doing business under the name of _____.

3. SOLE TRADER

The Bidder is an individual and if operating under a trade name, such trade name is as follows: _____

4. ADDRESS

The business address of the Bidder is as follows:

_____

_____

_____ Its phone number is _____

_____

Bidder

By: _____

EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this Contract the Contractor agrees as follows:

a. The Contractor will not discriminate against any employee or applicant because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to race, color, religion, sex, or national origin. Such action shall include but not be limited to the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause.

b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

c. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract understanding, a notice, to be provided, advising the labor union or worker's representative of the Contractor's commitments under the Equal Employment Opportunity Section of this Contract, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further OWNER Contracts.

e. The Contractor will include the provisions of this section in every subcontract or purchase order unless exempted by rules, regulations, or orders of the OWNER so that such provisions will be binding upon each Subcontractor or vendor.

(Use the following form for signatures by a CORPORATION):

_____
Corporate Name

ATTEST:

_____ _____
(Assistant) Secretary (Vice) President

(CORPORATE SEAL)

(Use the following form for signatures by and INDIVIDUAL):

BY: _____ (Seal)

WITNESS:

_____

(ACKNOWLEDGEMENT OF THE ABOVE SIGNATURE MUST BE NOTARIZED USING FORM ON FOLLOWING PAGE)

NONDISCRIMINATION CLAUSE

It is specifically agreed as part of the consideration of the signing of this Contract that the parties hereto, their agents, officials, employees or servants will not discriminate in any manner on the basis of age, handicap, race, color, creed, sexual orientation or national origin with reference to the subject matter of this Contract, no matter how remote.

This provision being incorporated for the benefit of Fayetteville Public Works Commission, Fayetteville, North Carolina and its residents may be enforced as set out in said ordinances, enforcement of this provision shall be by action for specific performance, injunctive relief, or other remedy as by law provided.

This provision shall be binding on the successors and assigns of the parties hereto with reference to the subject matter of this Contract.

(Use the following form for signatures by a CORPORATION):

_____
Corporate Name

ATTEST:

_____ BY: _____
(Assistant) Secretary (Vice) President

_____ BY: _____
(Printed Name) (Printed Name)

(Corporate Seal)

(Use the following form for signatures by a PARTNERSHIP or INDIVIDUAL):

BY:_____(SEAL)

_____
(Printed Name)

WITNESS:

_____

_____
(Printed Name)

NON-COLLUSIVE AFFIDAVIT

State of _____)
)
County of _____)

_____ being first duly sworn, deposes and says that:

(1) He is the _____
(Owner, Partner, Officer, Representative or Agent)
of _____ the BIDDER that has submitted the attached BID;

(2) He is fully informed respecting the preparation and contents of the attached BID and of all pertinent circumstances respecting such BID;

(3) Such BID is genuine and is not a collusive or sham BID;

(4) Neither the said BIDDER nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other BIDDER, firm, or person to submit a collusive or sham BID in connection with the Contract for which the attached BID has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any BIDDER, firm, or person to fix the price or prices in the attached BID or of any other BIDDER, or to fix any overhead, profit, or cost elements of the BID price or the BID price of any other BIDDER, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;

(5) The price or prices quoted in the attached BID are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the BIDDER or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

BY _____

ITS _____
(Title)

Subscribed and sworn to before me this _____ day of _____ , 20 ___ .

_____
Notary Public

My Commission Expires:

_____

END OF AFFIDAVIT

F.T.A. CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

(To be submitted with each bid or offer exceeding $100,000)

The undersigned ____certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq* .)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq., apply* to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official

_____ Name and Title of Contractor's Authorized Official

_____ Date

CERTIFICATION OF PRIMARY PARTICIPANT REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The Primary Participant, _____ (major third party contractor), certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction or records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(If the primary participant is unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.)

THE PRIMARY PARTICIPANT _____ CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET. SEQ. ARE APPLICABLE THERETO.

_____	_____
Signature	Title
_____	_____
Printed Name	Date

NORTH CAROLINA DIVISION OF WATER INFRASTRUCTURE SPECIAL CONDITIONS

The following pages are considered part of the Contract Documents by the North Carolina Department of Environmental Quality, Division of Water Infrastructure, in accordance with requirements of the State Revolving Fund (SRF).

- DAVIS-BACON INSTRUCTIONS FOR SRF PROJECT
- NC DIVISION OF WATER INFRASTRUCTURE MBE/WBE (DBE)
- COMPLIANCE SUPPLEMENT
- WAGE DETERMINATION SCHEDULE
- AMERICAN IRON AND STEEL (AIS) GUIDANCE FOR SRF PROJECTS IN NORTH CAROLINA

"General Decision Number: NC20220081 1/6/2023

Superseded General Decision Number: NC20210081

State: North Carolina

Construction Type: Heavy

Counties: Cumberland and Hoke Counties in North Carolina.

HEAVY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022	Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least $16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at https://www.dol.gov/agencies/whd/government-contracts.

Modification Number	Publication Date
0	01/06/2023

* SUNC2011-062 08/26/2011

	Rates	Fringes
CARPENTER, Includes Form Work....	$ 13.98 **	0.69
ELECTRICIAN.....	$ 15.41	3.13

LABORER: Common or General.....	$ 9.21 **	0.00
LABORER: Pipelayer.....	$ 12.87 **	2.21
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	$ 14.71 **	0.00
OPERATOR: Bulldozer.....	$ 14.63 **	0.00
OPERATOR: Loader.....	$ 15.13	2.79
TRUCK DRIVER.....	$ 13.12 **	1.89

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($16.20) or 13658 ($12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were

prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

DAVIS-BACON INSTRUCTIONS FOR SRF

To be included in the Contract Documents:

- The entire contents of 29 CFR 5.5
- The appropriate wage determination (usually Heavy). This determination must be the most current and have been in effect at least 10 days prior to bid opening. If a wage determination for the project location is not available, then the Statewide wage determination may be used. If it takes longer than 90 days to execute contracts and the wage determination changes, then the new wage rates must be incorporated into the contract. Wage Determinations can be found at: : http://www.wdol.gov/sca.aspx

During Construction:

- Post the Davis-Bacon Poster www.dol.gov/whd/regs/compliance/posters/fedprojc.pdf
- Post the appropriate wage rates. These should be the ones included in the specifications and any new classifications approved by the Department of Labor.
- Weekly payrolls are to be maintained onsite for all subject contractors and subcontractors. Number them for each week of the construction period including weeks that do not have payroll. Form WH 347 is suggested. Do not submit these to the State SRF office, submit them to the municipality for review. Link to Form WH 347 - - http://www.dol.gov/whd/forms/wh347.pdf
- The municipality will conduct interviews with employees when there are irregularities concerning wages being paid. Use Standard Form 1445.
- For additional wage classification approvals, complete form SF 1444 found at this link: http://www.dol.gov/whd/govcontracts/SF1444.pdf Email this form to: whd-cbaconformance_incoming@dol.gov

The entire contents of this package is:

1) These Instructions
2) 29 CFR 5.5
3) Davis-Bacon Poster
4) Payroll form WH 347

29 CFR §5.5 Contract provisions and related matters.

(a) The Agency head shall cause or require the contracting officer to insert in full in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in §5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, *Provided,* That such modifications are first approved by the Department of Labor):

(1) *Minimum wages.* (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH- 1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a

classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) *Withholding.* The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the

Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) *Payrolls and basic records.* (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site

at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of

any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees-(i) Apprentices.* Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) *Trainees.* Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the

corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) *Compliance with Copeland Act requirements.* The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) *Compliance with Davis-Bacon and Related Act requirements.* All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or §4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

(1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the conract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages.* The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts

the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

EMPLOYEE RIGHTS
UNDER THE DAVIS-BACON ACT
FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES — You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME — You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT — Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES — Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY — If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

U.S. Wage and Hour Division

WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Employment Standards Administration | Wage and Hour Division

WH 1321(Revised April 2009)

BIG ROCKFISH CREEK OUTFALL CONTRACT II

U.S. Department of Labor
Wage and Hour Division

PAYROLL

(For Contractor's Optional Use; See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

U.S. Wage and Hour Division
Rev. Dec. 2008

OMB No.: 1235-0008
Expires: 01/31/2015

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐	ADDRESS	
PAYROLL NO.	FOR WEEK ENDING	PROJECT AND LOCATION / PROJECT OR CONTRACT NO.

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	O. OR ST.	(4) DAY AND DATE — HOURS WORKED EACH DAY	(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS: FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	(9) NET WAGES PAID FOR WEEK
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employe during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that it will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement

Instructions

(This package combines the various aspects of State of NC HUB program requirements and Federal DBE requirements into a single compliance supplement in order to eliminate redundancy and ambiguity)

Item	What to do with it
Good Faith Efforts Form	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table A (Summary of firms on job)	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table B (per item being subbed)	Provided by low bidder if SRF project or SRP/SEL* that obtains less than 10% M/WBE utilization (see page 2)
Provide documentation of anything you did that is mentioned later in this supplement	- Proof of trade paper advertisement - Printouts of DBE sources used - Solicitation emails and/or letters
~~Additional Forms for SRF Projects~~ (these forms are currently not applicable)	
~~6100-3 (per M/WBE firm)~~	~~Provided by low bidder if SRF project~~
~~6100-2~~	~~Distributed to M/WBE firms if SRF project~~
~~Subs submit concerns on 6100-2 forms to:~~	~~**Michael Pigram**~~ ~~**Region 4, Atlanta Federal Center**~~ ~~**61 Forsyth Street**~~ ~~**Atlanta, GA 30303-8960**~~

NOTES on this Compliance Supplement

Verifiable Goals

- **EPA MBE/WBE participation goals:** MBE 10.9%
WBE 10.4%

These are goals that the State reports against and are not quotas. *The good faith efforts must be adhered to and all forms provided regardless of what percentage utilization is achieved.*

- **State of NC MBE/WBE participation goal:** 10% (combined)

Table B is not required for SRP and SEL projects if you achieve 10% utilization.

DBE (MBE or WBE) Certification

In order for a firm to count towards the goals, a firm must be properly certified. Table A and Table B both provide spaces to note who certified the firm. The North Carolina Department of Administration and North Carolina Department of Transportation are the most common certifications we see listed. Division of Water Infrastructure staff verify all certifications listed.

For SRF projects, please note the EPA's six Good Faith Efforts found in 40 CFR 33
Filling out the Good Faith Efforts Form and providing Table B (if subcontracting is achieved) constitutes compliance with EPA's six good faith efforts.

(1) Ensure MBE/WBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local Government recipients, this will include placing MBE/WBEs on solicitation lists and soliciting them whenever they are potential sources.
(2) Make information of forthcoming opportunities available to MBE/WBEs and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
(3) Consider in the contracting process whether firms competing for large contracts could subcontract with MBE/WBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities in order to increase opportunities for participation by MBE/WBEs in the competitive process.
(4) Encourage contracting with a consortium of MBE/WBEs when a contract is too large for one of these firms to handle individually.
(5) Use the services and assistance of the SBA and the MBDA.
(6) If the prime contractor awards subcontracts, require the prime contractor to take the steps in subparagraphs (1)-(5) of this section.

Pertinent State of North Carolina Administrative Code Regarding M/WBE Compliance. The provisions in this Compliance Supplement constitute compliance with the Rules below.

Owner Requirements	01 NCAC 30I .0306
Contractor Requirements	01 NCAC 30I .0308

Resources

Some sources for identifying MBE/WBE (DBE) firms

- https://www.ips.state.nc.us/vendor/SearchVendor.aspx (NCDOA)
- https://www.ebs.nc.gov/VendorDirectory/default.html (NCDOT)
- http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm (US SBA)

Some sources for finding minority trade papers for potential solicitation advertisements and Federal advertising options

- http://web.sba.gov/subnet/ (US SBA Subnet advertising website)
- https://www.mbda.gov/ (US Dept. of Commerce)
- https://ncadmin.nc.gov/businesses/hub (NC HUB Office)

Good Faith Efforts Form

Attempts to provide subcontracting opportunities for MBE/WBE firms.

Per 01 NCAC 30I .0101, 50 points must be claimed below by the bidder.
(This is identical to State of NC Affidavit A)

☐ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.

☐ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.

☐ **3** – **(15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.

☐ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.

☐ **5** – **(10 pts)** Attended prebid meetings scheduled by the public owner.

☐ **6** – **(20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.

☐ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.

☐ **8** – **(25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.

☐ **9** – **(20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.

☐ **10** - **(20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

Results of Good Faith Efforts Undertaken *(you must check one box below)*

☐ No subcontractors are being used for this contracted work. Fill out Table A listing only the Prime Contractor. (This statement takes the place of State of NC Affidavit B)

☐ Subcontractors are being used. Fill out Table A and B for each trade**. Each Table B lists 3.**

☐ Subcontractors are being used. If any Table B has fewer than 3 solicitations you must also advertise in an M/WBE trade paper and indicate what source of M/WBE firms you used (*must list at least one)*. Some possible papers and sources of M/WBE firms are listed in the Instructions of this Supplement.

Name of the Trade Paper: _____

Submit proof of advertisement with package

M/WBE Sources: Source:_____ Source:_____

Submit printouts from M/WBE source(s)

Certification Statement and Affidavit of Contractor.
The below affidavit constitutes compliance with 01NCAC 30I .0308(7)(a) and (b) and takes the place of State of North Carolina Affidavits C and D.

I have read the information in this compliance supplement and all information provided to the State in this package is accurate and true to the extent of my knowledge including the calculated percentages and the good faith efforts presented herein.

_____ _____

Prime Contractor Company Name (Print) Prime Contractor Representative (Sign & Date)

SEAL

State of_____, County of _____

Subscribed and sworn to before me this _____day of _____ 20____

Notary Public _____

My Commission Expires_____

_____ _____

Applicant Name (Print) Applicant Authorized Representative (Sign & Date)

_____

Division of Water Infrastructure Project Number

Table A: Prime Contractor and list of selected subcontractors

List Prime and ALL of the selected subcontractors (both DBE's and non-DBE's) being used on the project. Each Trade listed on this sheet should have a completed Table B: Subcontract Solicitation List showing the DBE firms contacted and given opportunities to bid.

Company Name (list prime first then subs)	**Company Address and Phone**	**Trade (Above) and Price (Below)**	**MBE or WBE and certifying agency if applicable**	**(State use only) Listed in EPLS as Debarred?**
		$		
		$		
		$		
		$		

Calculate M/WBE utilization as a percent (00.00%) of the prime contract. Limited to 100% even if the Prime is a DBE.

MBE and WBE subs total	**$**	
Prime Contract Price	**$**	**_____%**

Note: Table A substitutes for both the State of NC "Identification of Minority Participation" form and EPA Form 6100-4.

Table B: Subcontract Solicitation List

Table B is required if:

1) Project is Federally funded (**SRF**) OR;
2) Project is a State Reserve Project or State Emergency Loan (**SRP or SEL**) and Utilization % on Table A is less than 10%
3)

Trade: _____(enter the trade being solicited, paving, hauling etc.)

List the firm being used on the project first. If three MBE or WBE firms are not listed, additional information must be provided showing advertisements and sources used to identify MBE/WBE subs.

Use as many of these sheets as are necessary to cover every trade being subbed out.

Company Name	Company Address and Phone	MBE or WBE and certifying agency if applicable.	How was this firm contacted (email, letter, phone) and what was the result of the solicitation?*

***Must submit copies of emails or letters. If phone calls were made this sheet can serve as documentation of calls.

MBE/WBE (DBE) – Change or Add a Subcontractor Form

According to EPA guidance on 40 CFR 33.302

If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor.

Please provide the information below **if the subcontracted work in question was included in previously submitted good faith efforts documentation**:

Prime Contractor:			
Subcontracted work:			
Previous Subcontractor:			
Reason this firm did not complete the work:			
New subcontractor and DBE status:	☐MBE	☐WBE	☐N/A

If this is a new trade being subcontracted, or was not documented in the original Project Bid Information submittal to the State then good faith efforts to solicit a DBE firm must be documented. As the original DBE instructions indicate, please provide a Table B from those original instructions, showing all the DBE firms contacted to perform this work. If three (3) firms are not listed on Table B, then additionally you must submit proof of an advertisement in a minority trade paper and evidence that there were not three reasonably available firms in the work area. The EPA provides in 33.301(a) that good faith efforts are to be carried out "…to the fullest extent practicable…". If solicitations were not carried out due to being impracticable, please attach this explanation to this form.

Please follow the steps below for new subcontracted work:

Indicate the new trade being subcontracted:			
Indicate the firm being used and DBE status:	☐MBE	☐WBE	☐N/A
Attach Table B			

(For State Use) Is this sub debarred?	☐Yes	☐No

Project Owner/Applicant: _____

Project Number: _____

Signature of Prime Contractor's Representative: _____

AMERICAN IRON AND STEEL (AIS)

GUIDANCE FOR SRF PROJECTS IN NORTH CAROLINA

This state guidance **summarizes** the requirements under Subsection 436 (a)(2) of the Consolidated Appropriations Act of 2014 that SRF recipients only use iron and steel products produced in the United States. The Environmental Protection Agency provides full guidance on the requirements at the following website:

http://water.epa.gov/grants_funding/aisrequirement.cfm.

Recipients of subject SRF awards must submit the executed **Certification for SRF Projects** and any waiver requests with their Bid Package. The recipient cannot receive a promissory note without these items.

Manufacturers can use the template "Compliance Certification" to document that materials are "produced in the United States."

Contents

AMERICAN IRON AND STEEL (AIS)

CERTIFICATION FOR SRF PROJECTS

Recipients of subject SRF awards must submit **this executed form and any waiver requests** with their Bid Information package to the State SRF program in order to receive funding.

The __(Applicant)_____ certifies that their contractors performing construction, alteration, maintenance and repair of the public treatment works under project number _____ will comply with subsection 436 (a)(2) of the Consolidated Appropriations Act of 2014 and only use iron and steel products produced in the United States.

Contractor Representative	**Project Applicant/Owner Representative**
(print)_____	(print)_____
(sign and date)_____	(sign and date)_____
Company Name	**Applicant/Owner Name and Project No.**
_____	_____

AIS WAIVER INSTRUCTIONS

Approved national waivers can be found at this website:

http://water.epa.gov/grants_funding/aisrequirement.cfm

Please note that a national waiver for "*de minimis*" iron and steel components has been approved. A table is included in this document for use in documenting what items are to be considered as covered under this waiver. Note that no single *de minimis* item can be more than 1% of the total material cost of the project and the total of all *de minimis* items must not exceed 5% of the **total material cost of the project**.

Waiver Requests are provided for in subsection 436(b) of the Act. It states they will be granted if the Administrator of the EPA finds that:

(1) Applying subsection (a) would be inconsistent with the public interest;

(2) Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

A checklist of items for a complete waiver application package can be found in the EPA guidance document for AIS found here:

http://water.epa.gov/grants_funding/upload/AIS-final-guidance-3-20-14.pdf

- Submit DWSRF waiver requests to vincent.tomaino@ncdenr.gov.
- Submit CWSRF waiver requests to mark.hubbard@ncdenr.gov.

The State will forward these to the EPA for a final determination.

MATERIALS COVERED BY AIS

Lined and unlined pipes and fittings, manhole covers, municipal castings (detailed below), hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel (detailed below), reinforced precast concrete and construction materials (detailed below). Products must be composed of greater than 50% iron and steel measured by cost and permanently incorporated into the project to be subject to the provision.

Municipal Castings	**Structural Steel**	**Construction Material**
Access Hatches	Wide Flange shapes	Wire Rod
Ballast Screen	I-beams	Bar
Benches	Channels	Angles
Bollards	Angles	Concrete Reinforcing Bar
Cast Bases	Tees	Wire
Cast Iron Hinged Hatches	Zees	Wire Cloth
Cast Iron Riser Rings	H-piles	Wire Rope and Cables
Catch Basin Inlet	Sheet piling	Tubing
Cleanout/Monument Boxes	Tie Plates	Framing
Construction Covers and Frames	Cross Ties	Joists
Curb and Corner Guards		Trusses
Curb Openings	(note: at least one	Fasteners
Detectable Warning Plates	dimension must be 3	Welding Rods
Downspout Shoes	inches or greater to	Decking
Drainage Grates, Frames and Inlets	be subject)	Grating
Inlets		Railings
Junction Boxes		Stairs
Lampposts		Access Ramps
Manhole Covers, Rings, Frames and		Fire Escapes
Risers		Ladders
Meter Boxes		Wall Panels
Service Boxes		Dome Structures
Steel Hinged Hatches		Roofing
Steel Riser Rings		Ductwork
Trash Receptacles		Surface Drains
Tree Grates		Cable Hanging Systems
Tree Guards		Manhole Steps
Trench Grates		Fencing and Fence
Valve Boxes, Covers and Risers		Tubing
		Guardrails
		Doors Stationary Screens

Mechanical and electrical components, equipment and systems are not subject to AIS. See the EPA guidance for details.

TEMPLATE COMPLIANCE CERTIFICATIONS FOR MATERIALS COVERED BY AIS

Company Name:

Company Address:

SRF Project name and project number:

I_____, certify that the following products were produced at the following location or steps in the production of the listed products, occurred at the following location:

Location:

Product	Step in production (Final production, melting, bending, etc.)
1)	
2)	
3)	

Therefore, these materials are “produced in the United States.”

_____ _____

(signature and title of company representative) (date)

DE MINIMIS LIST

Item	**Cost**

Total *De Minimis* Cost: **$_____**

Total Material Cost For Project: **$_____**

De Minimis Cost is _____ percent of total material costs.

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FAYETTEVILLE PUBLIC WORKS COMMISSION
Small Local Supplier Subcontractor Disclosure Form

Contractor: _____

Address & Phone: _____

Project: _____

Name: _____

Pay Application #: _____ Period: _____

Please complete the below form by providing the necessary information for the estimated payment to be made to each subcontractor, vendor, or supplier for the work associated with the identified pay application. This form must be fully completed and attached to each pay application.

Firm Name, Address, and Contact Information	Estimated Payment Amount	Type of Work/Commodity (Include NAICS Code)

_____
Signature

_____ , _____
Printed Name Title

_____
Date

SECTION B – CONTRACT EXECUTION DOCUMENTS

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NOTICE OF AWARD

TO: _____
_____
_____

PROJECT DESCRIPTION: **BIG ROCKFISH CREEK OUTFALL CONTRACT II**

The OWNER has considered the BID submitted by you for the above described work in response to its Advertisement for Bids dated _____ and Instructions to Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____.

You are required by the Instructions to Bidders to execute the Agreement and furnish the required Performance Bond, Payment Bond, and Certificates of Insurance within ten (10) calendar days from the date of this NOTICE to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the OWNER's acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____day of _____, 2023.

OWNER: **FAYETTEVILLE PUBLIC WORKS COMMISSION**
FAYETTEVILLE, NC

BY: Candice S. Kirtz
TITLE: Director of Supply Chain

ACCEPTANCE OF AWARD

BIG ROCKFISH CREEK OUTFALL CONTRACT II

Receipt of the preceding NOTICE OF AWARD is hereby acknowledged this the _____ day of _____, 2023.

(CONTRACTOR)

By:_____

Title:_____

- END OF SECTION -

State of North Carolina
Cumberland County

CONSTRUCTION AGREEMENT

THIS CONSTRUCTION AGREEMENT ("Agreement" or "Contract") is made by and between the Fayetteville Public Works Commission ("PWC"), a North Carolina public authority, and _____ ("Contractor"), a _____ registered to do business in North Carolina (each of each of PWC and Contractor is a "Party" and both are collectively the "Parties") as of the date of execution last written below (the "Effective Date"). The Parties agree as follows:

1. The Construction Project. Contractor shall furnish and bear solely the entire cost of all labor and materials necessary for the construction and/or renovation of the Project (defined hereinbelow) as specified in the Contract Documents (defined hereinbelow) and complete all Work on the Project in a Workmanlike manner in strict accordance with the Contract Documents, schedule delivery of the new materials, furnish and bear solely the entire cost of all supervision, contract administration, equipment, tools, and other means necessary to complete the Project, perform every obligation imposed by the Contract Documents, and be solely responsible for the clean-up and disposal of all materials and debris relating to or arising from the construction and renovation, subject to any exceptions that are specifically set forth in the Contract Documents. Except as otherwise specifically provided in the Contract Documents, Contractor is solely responsible for all construction means, methods, techniques, sequences, procedures, safety precautions or programs, supervising, coordinating, and performing all the Work necessary to complete the Project; provided, however, PWC shall have the right, without incurring any liability to the Contractor, to suspend Contractor's performance when a PWC employee, in his or her opinion, observes a safety violation involving a threat to life or imminent danger of bodily injury, and the suspension shall remain in effect until Contractor remedies the safety violation.

2. Terms. Capitalized terms used in this Agreement have the meaning specified below:

"Business Day" means each calendar day that is not a Saturday, Sunday, holiday observed by the federal government for its employees, or holiday observed by the State of North Carolina for its employees.

"Completion of the Project" means: (i) the Project is completed in accordance with this Agreement, except for punch list items; (ii) PWC has received any required temporary or final certificate of occupancy from the governmental agency with jurisdiction over the Project; and (iii) the registered architects or engineers (the "Designer(s)") who designed portions or components of the Project have issued certificates of Completion of the Project as to those portions or components.

"Contract Documents" means the following documents that were either made available to Contractor by PWC during the bid solicitation process (including Drawings) or executed by the Parties or both, which are all incorporated by reference herein:

a. This Agreement
b. Bid Documents

c. Contractor's Submitted Bid
d. Bid Bond
e. Form of Exceptions
f. Notice of Award
g. Acceptance of Award
h. Performance Bond
i. Payment Bond
j. Copy of General Contractor's License
k. Certificate of Insurance
l. Technical Specifications
m. Additional Specifications

The following documents may be delivered or issued on or after the Effective Date of the Agreement and may not be attached to this Agreement, but are considered Contract Documents when executed by the Parties:

n. Notice to Proceed and Acceptance of Notice
o. Work Change Directive(s)
p. Change Order(s)
q. Field Order(s)

There are no Contract Documents other than those identified in this Agreement. The Contract Documents may only be amended, modified, or supplemented as provided in this Agreement in a writing signed by the Parties.

"Fault" means a breach of contract by Contractor, negligent, reckless, or intentional act(s) or omission(s) constituting a tort under applicable statutes or common law by one or more Responsible Persons, or violation(s) of applicable statute(s) or regulation(s) by a Responsible Person.

"Project" means _____ _____, as more specifically set forth in the Contract Documents.

"Responsible Person" means the Contractor and each of its employees, agents, representatives, subcontractors, or other persons and entities for which Contractor may be liable or responsible as a result of any statutory, tort, or contractual duty.

The terms used in this Agreement shall have the meaning as stated herein and in the General Conditions. In the event of a conflict between the terms of this Agreement and any other component(s) of the Contract Documents, the terms of this Agreement shall govern.

3. Contract Price. PWC shall pay Contractor for Completion of the Project in accordance with the Contract Documents the amount identified in the accepted Bid Form of Contractor, being in the total amount of $_____ (the "Price"). Contractor understands and acknowledges that the Price is derived from a specific appropriation of funds provided for the Project. Contractor agrees and acknowledges the Price is equal to the aggregate cost of all Work to be done on the Project, including all labor, materials, equipment, apparatus, and supplies, set in accordance with the amount specified on the Bid Form submitted by Contractor and accepted by PWC.

4. Contract Times. The Parties shall perform their obligations under this Agreement in compliance with all scheduling deadlines set forth in the Contract Documents. The Contractor shall commence the Work to be performed under this Agreement on a date to be specified in accordance with the Notice to Proceed issued by PWC. Contractor shall achieve Completion of the Project no later than _____ consecutive calendar days from said date plus any modifications thereof allowed in accordance with the Contract Documents (the "Completion Date").

5. Payment. PWC shall pay Contractor in installment payments plus a final payment, as set forth in the Contract Documents. For each applicable installment payment, Contractor shall submit an application for payment in accordance with the Contract Documents. An application for payment will be processed by PWC as provided in the Contract Documents. Such installment payments shall reflect the actual cost of the Work, not to exceed in total the Price, and the allocable portion of the total Price for said installment. PWC shall make payment to the Contractor, less any applicable retainage set forth in the Contract Documents; provided, however, that PWC may withhold all or a portion of a payment on account of (1) incomplete Work, (2) defective or nonconforming Work, (3) claims filed or a reasonable basis to believe that such claims will be filed imminently, (4) failure of the Contractor to make payments properly for labor, services, materials, equipment or subcontracts, (5) damages caused to PWC or another party by one or more Responsible Persons, or (6) failure to comply with the terms and conditions of this Agreement. In the final payment, PWC shall pay the balance of the Price, including all retained amounts, less any Liquidated Damages and other applicable damage and claim amounts, to Contractor within forty-five (45) days of Completion of the Project; provided, however, that PWC may withhold a reasonable sum from the final payment to ensure correction of any final items or condition on the Project.

6. Retainage. Subject to any restrictions applicable to any federal grant funds that may be utilized for the Project, PWC may, in its discretion, retain up to five percent (5%) of any periodic payment due Contractor; provided, however, when the Project is fifty percent (50%) complete, PWC, with written consent of the surety, shall not retain any further retainage from periodic payments due Contractor if Contractor continues to perform satisfactorily and any nonconforming Work identified in writing prior to that time by PWC or the Designer has been corrected by Contractor and accepted by PWC or the Designer, and provided further that full payment, less authorized deductions, shall also be made for those line item trades that have reached one hundred percent (100%) completion of their contract obligations by or before the Project is fifty percent (50%) complete if Contractor has performed satisfactorily in accordance with G.S. 143-134.1(b2), contingent upon PWC's receipt of an approval or certification from the Designer that the Work performed by the subcontractor is acceptable and in accordance with the Contract Documents. If PWC determines Contractor's performance is unsatisfactory, PWC may, in its discretion, reinstate retainage for each subsequent periodic application for payment as authorized in this Section up to the maximum amount of five percent (5%). The Project shall be deemed fifty percent (50%) complete when Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the Price, except the value of materials stored on-site shall not exceed twenty percent (20%) of Contractor's gross project invoices for the purpose of determining whether the Project is fifty percent (50%) complete. Within 60 days after the submission of a pay request and one of the following occurs, as specified in the Contract Documents, PWC, with written consent of the surety, shall release to Contractor all retainage on payments held by PWC: (i) PWC receives a certificate of substantial completion from the Designer in charge of the Project; or (ii) PWC receives beneficial occupancy or use of the Project; provided, however, PWC may in its discretion retain sufficient funds to secure Completion of the Project or corrections on any Work. If PWC retains

funds, the amount retained shall not exceed two and one-half times the estimated value of the Work to be completed or corrected. Any reduction in the amount of the retainage on payments shall be with the consent of Contractor's surety. The existence of any third-party claims against Contractor or any additive change orders to the Construction Documents shall not be a basis for delaying the release of any retainage on payments. Notwithstanding anything in this Section to the contrary, following fifty percent (50%) completion of the Project, PWC shall be authorized to withhold additional retainage from a subsequent periodic payment, not to exceed five percent (5%), in order to allow PWC to retain two and one-half percent (2.5%) total retainage through the Completion of the Project. In the event that PWC elects to withhold additional retainage on any periodic payment subsequent to release of retainage on a line-item of Work pursuant to G.S. 143-134.1(b2), Contractor may also withhold from the subcontractors remaining on the project sufficient retainage to offset the additional retainage held by PWC, notwithstanding the actual percentage of retainage withheld by PWC of the Project as a whole. Neither PWC's nor Contractor's release of retainage on payments as part of a payment in full on a line-item of Work pursuant to G.S. 143-134.1(b2) shall affect any applicable warranties on Work done by Contractor or subcontractor, and the warranties shall not begin to run any earlier than either PWC's receipt of a certificate of substantial completion from the Designer in charge of the Project or PWC receives beneficial occupancy.

7. Liquidated Damages. Time is of the essence with respect to performance of each of the Parties' obligations under this Agreement. Contractor recognizes and acknowledges that PWC will suffer financial and other losses if the Project is not completed by the Completion Date. The Parties recognize and agree that the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by PWC if the Project is not completed by the Completion Date. Accordingly, instead of requiring any such proof, Contractor and PWC agree that in the event Contractor fails to achieve Completion of the Project by the Completion Date, Contractor shall pay to PWC as liquidated damages to compensate PWC for damages related to the delayed Completion of the Project one thousand dollars ($1000.00) per day ("Liquidated Damages") for each calendar day Contractor fails to achieve completion of the Work by the Completion Date.

8. Contractor's Representations and Warranties. In order to induce PWC to enter into this Agreement, Contractor makes the following representations and warranties to PWC:

a. Contractor is duly licensed in the State of North Carolina to complete all Work necessary for the Project, is duly organized, validly existing and in good standing and has all requisite powers, rights, and authority to execute, enter into, and perform this Agreement in accordance with the terms and conditions of this Agreement, and this Agreement constitutes a legal, valid, and binding obligation of Contractor enforceable against it in accordance with its terms.

b. Contractor has read the Contract Documents, and acknowledges and understands all data, materials, specifications, and requirements identified in the Contract Documents.

c. Contractor has visited the site for the Project, conducted a thorough, visual examination of the site and adjacent areas, and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance in completing the Project. Contractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance to complete the Project.

d. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the site and all drawings of physical conditions relating to existing surface or subsurface structures at the site that have been identified in the Contract Documents and any accompanying reports and drawings, and (2) reports and drawings relating to hazardous environmental conditions, if any, at or adjacent to the site that have been identified in the Contract Documents and any accompanying reports and drawings.

e. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, if any, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

f. Based on the information and observations referred to in subsection e. of this Section, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Price commencing on the commencement date and in accordance with the other terms and conditions of the Contract.

g. Contractor is aware of the general nature of Work to be performed by PWC and others at the Site that relates to the Work as indicated in the Contract Documents.

h. Contractor has given PWC's Designer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by the Designer is acceptable to Contractor.

i. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

j. Contractor's entry into this Agreement constitutes an incontrovertible representation by Contractor that, without exception, all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

k. Contractor has no business or personal relationship with any PWC Commissioner, officer, director, manager, or supervisor and Contractor covenants to disclose immediately to PWC any such relationship that develops during the performance of Work on the Project.

9. Contractor's Payment Obligations. Contractor shall pay all of its obligations arising out of or in connection with the Project in a timely manner to all persons supplying materials in the prosecution of the Work and to all laborers and others employed thereon.

10. Performance and Payment Bonds. Contractor shall obtain and deliver to PWC a performance bond in the amount of one hundred percent (100%) of the Price, conditioned upon the faithful performance of the Project and all Work in accordance with the Contract Documents, which bond shall be solely for the protection of PWC. Contractor shall obtain and deliver to PWC a payment bond in the amount of one hundred percent (100%) of the Price, conditioned upon the prompt payment for all labor or materials for which the Contractor or one or more of its subcontractors is liable, which payment bond shall be solely for the protection of the persons furnishing materials or performing labor for which the Contractor is liable. The performance bond and the payment bond shall be executed by one or more surety companies legally authorized to do business in the State of North Carolina, shall become effective upon the awarding of the construction contract by PWC to Contractor, and shall at all times comply with the requirements set forth in Article 3 of North Carolina General Statutes Chapter 44A. In the event PWC deems the surety or sureties upon any bond necessary for this Agreement and the completion of the Project, or if for any reason, such bond ceases to be adequate to cover the performance and/or payment of the Work, Contractor shall, at its expense, within five (5) days after the receipt of notice from PWC, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to PWC. In such event no further payment to Contractor shall be deemed to be due under this Agreement until new or additional security for the performance and payment of the Project shall be furnished in manner and form satisfactory to PWC. Contractor understands and acknowledges that PWC, as a public authority, is not subject to the provisions of Articles 1 and 2 of Chapter 44A of the General Statutes, in accordance with G.S. 44A-34 and applicable law.

11. Contractor's Damage Repair Obligations. Contractor shall be responsible for all damages to the property of the City of Fayetteville and of PWC that may result from the normal procedure of a Responsible Person's actions in the prosecution of the Work or that may be caused by or result from the negligence of a Responsible Person during the progress of or connected with the prosecution of the Work, whether within the limits of the Work or elsewhere. Contractor shall promptly restore all such property so damaged to a condition as good as it was immediately prior to Contractor initiating the Work on the Project.

12. Defective Work. The Project shall be subject to observation and approval by PWC, Designer, and representatives of governmental agencies with jurisdiction over the Project. PWC and Designer shall be entitled to enter at all reasonable times the premises subject to construction or renovation to inspect the Work performed by or on behalf of Contractor, provided that such entry and inspection does not materially interfere with the progress of construction. Contractor shall correct promptly, at no cost to PWC, all Work reasonably rejected by PWC or by its representatives. Should Contractor fail to correct rejected Work, PWC may, acting in its sole discretion, correct such Work and the Contractor shall pay PWC's actual costs of correction and any other applicable amounts identified in the Contract Documents.

13. As-Built Drawings. Contractor shall maintain during the progress of the Project as-built drawings indicating the current status of the Project as actually performed. Upon Completion of the Project, Contractor shall prepare a final version of such as-built drawings and submit them to PWC for approval.

14. Assignment. This Agreement shall be binding upon and inure to the benefit of the Parties, their legal representatives, successors, and assigns. Contractor may not assign, transfer, convey, or encumber, whether voluntarily or by operation of law, this Agreement or any obligations, rights under, or interests in this Agreement to a third party without the prior

written consent of PWC; and, specifically, but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

15. Indemnity. Contractor shall indemnify, defend, and hold harmless PWC and its Commissioners, officers, employees, agents, and representatives and the City of Fayetteville and its elected officials, managers, employees, agents, and representatives and Design Engineer (collectively "Indemnitees") from and against all claims, actions, liabilities, damages, losses, costs, and expenses (including, without limitation, injury to or death of any persons and damage to property, economic and consequential damages and attorneys' fees) asserted by one or more third parties against one or more of the Indemnitees if the Fault of one or more Responsible Persons is a proximate cause of the loss, damage, or expense indemnified. Contractor's obligation to indemnify, defend, and hold harmless the Indemnitees shall survive the termination of this Agreement.

16. Insurance. Contractor shall maintain during the completion of the Project and for at least three (3) years thereafter the insurance coverage set forth in the Contract Documents, which insurance shall be placed with insurance companies authorized to do business in the State of North Carolina and rated A minus VII or better by the current edition of Best's Key Rating Guide or otherwise approved in writing by PWC. Prior to initiating any Work on the Project, Contractor shall deliver certificates of insurance confirming each such coverage required by the Contract Documents, and Contractor shall direct its insurers to provide annually to PWC certificates confirming each such coverage during the coverage period. PWC shall be named as an additional insured in the comprehensive automobile and commercial liability insurance policies. Commercial general liability coverage shall be written on an "occurrence" basis. Contractor shall not reduce or allow the required insurance coverages to lapse without PWC's prior written approval. All policies for insurance must be endorsed to contain a provision giving PWC a thirty (30) calendar day prior written notice by certified mail of any cancellation of that policy or material reduction in coverage. Should a notice of cancellation be issued for non-payment of premiums or any part thereof, or should Contractor fail to provide and maintain certificates as set forth herein, PWC shall have the right, but shall not have the obligation, to pay such premium to the insurance company or to obtain such coverage and to deduct such payment from any sums that may be due or become due to Contractor, or to seek reimbursement for said payments from Contractor. Any such sums paid by PWC shall be due and payable immediately by Contractor upon notice from PWC. The insurance provisions of this Agreement shall not be construed as a limitation on Contractor's responsibilities and liabilities pursuant to the terms and conditions of this Agreement. Contractor's obligation to maintain insurance for three (3) years after Completion of the Project shall survive the termination of this Agreement.

17. Warranty. The Contractor hereby grants to PWC a warranty on all materials and Workmanship involved in the Project for a period of one (1) year from the Completion Date and a period of two (2) years from the Completion Date for any latent structural defects. PWC shall give written notice to Contractor of any claim under this Section within the time specified hereinabove. This warranty shall be in addition to, and not in derogation of, all other rights and privileges which PWC may have under law, equity, or instrument, and shall survive the Completion Date and the final settlement and shall be binding on Contractor notwithstanding any provision in any other writing executed by PWC heretofore or contemporaneous with the execution of the Agreement or prior to the Completion Date.

18. Waiver. No failure on the part of any party to exercise, and no delay in exercising, any right, power, or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right hereunder preclude any other or further cumulative and not exclusive of any remedies provided by law. This Agreement shall be binding upon and inure to the benefit of the parties, their legal representatives, successors, and assigns. This Agreement may not be assigned, transferred, conveyed, or encumbered, whether voluntarily or by operation of law, by either party without the prior written consent of the other party, which consent shall not be unreasonably withheld.

19. Law. THIS AGREEMENT SHALL BE GOVERNED BY AND INTERPRETED AND ENFORCED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NORTH CAROLINA WITHOUT GIVING EFFECT TO THE CHOICE OF LAW PROVISIONS THEREOF. The Contractor shall at all times comply with all applicable Federal, state, and local laws and building codes in the performance of its obligations under the Agreement.

20. Dispute Resolution. In the event of any dispute, controversy, or claim of any kind or nature arising under or in connection with this Agreement (a "Dispute") and involving any two or more of the following parties, PWC, Designer, Contractor or any subcontractor of Contractor, the party initiating the Dispute shall serve written notice of a Dispute on the party(ies) to the dispute, and those parties shall endeavor to settle the dispute first through direct, informal discussions between the parties' selected representatives. Any such representative(s) shall have binding authority to settle the Dispute. In the event the parties do not settle the Dispute within ten (10) days from the date of written notice of the Dispute, any party to the Dispute may, by written notice to the other party(ies), engage a mediator certified under the laws of the State of North Carolina to mediate the Dispute within thirty (30) days of such notice. The parties to the Dispute shall attend mediation in good faith. In the event mediation is unsuccessful, any party to the dispute may initiate arbitration proceedings. Any controversy or claim arising out of or relating to the Contract Documents, or the breach thereof, shall be settled by binding arbitration administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. All of the foregoing dispute resolution procedures shall be held in Cumberland County, North Carolina. The costs of the mediator and arbitrator in a dispute resolution process shall be divided equally among the parties to the process; provided, however, PWC shall bear at least one-third of the cost if PWC is a party to the dispute resolution and the remainder of the cost shall be divided equally among the other parties participating in the dispute resolution. PWC shall, in its contractual arrangements with Designer, and Contractor shall, in its contracts with subcontractors and they in their contracts with lower-tier subcontractors authorize and direct such parties to participate in the dispute resolution procedures set forth in this Section. Unless otherwise directed in writing by PWC, Contractor shall continue the Project and maintain compliance with the scheduling deadlines set forth in the Contract Documents during any dispute resolution proceedings. If Contractor continues to perform, PWC shall make payments due for the continued performance in accordance with this Agreement. The provisions of this Section shall not extend any applicable statutes of limitation or repose.

21. Execution; Modification; Entire Agreement; Severability. This Agreement may be executed in counterparts with the same effect as if the signatures to each counterpart were upon a single instrument, and all such counterparts together shall be deemed an original of this Agreement. For purposes of this Agreement, a facsimile copy or scanned copy or photocopy of a party's signature shall be sufficient to bind such party. This Agreement shall be subject to

execution by electronic means in accordance with Article 40 of Chapter 66 of the North Carolina General Statutes. No oral communication, promise, understanding, or agreement before, contemporaneous with, or after the execution of this Agreement shall affect or modify any of the terms and conditions and obligations of the Contract Documents. The Contract Documents shall be modified only by a subsequent writing signed by both Parties. The Contract Documents shall be conclusively considered to contain and express all the terms and conditions agreed upon by the Parties, notwithstanding any prior or contemporaneous written communication, promise, understanding or agreement. Should any provision of this Agreement or any of the Contract Documents at any time be in conflict with any law, statute, rule, regulation, order, or ruling and thus be unenforceable, or be unenforceable for any other reason, then the remaining provisions of this Agreement shall remain in full force and effect and the court or arbitrator shall give the offending provision the fullest meaning and effect permitted by law. The titles of the Sections throughout this Agreement are for convenience only and the words contained therein shall in no way be held to explain, modify, amplify or aid in the interpretation, construction, or meaning of the provisions of this instrument.

22. Notices. Any notice which either Party is required or desires to give the other hereunder shall be deemed sufficiently given if, in writing, it is delivered personally, or sent by certified U.S. mail, return-receipt requested, postage prepaid, to the addresses listed herein below, or such other address as either Party shall give to the other Party by written notice in accordance herewith. Any notice given herein by personal delivery shall be deemed delivered when received. Any properly addressed notice given herein by certified mail shall be deemed delivered on third Business Day after the same is deposited in an official United States Post Office, postage prepaid, or if sooner upon the date when the return receipt therefore is signed, or refusal to accept the mailing by the addressee is noted thereon by the postal authorities.

To PWC:
Fayetteville Public Works Commission
Attn: Marion J. Noland, Interim CEO/General Manager PO Box 1089
Fayetteville, NC 28302

To Contractor:

23. Termination. PWC may terminate this Agreement immediately if during the progress of the Work or during the warranty period, the Contractor:

a. Persistently fails to prosecute the Work properly and in accordance with this contract, including but not limited to include failure to provide sufficient crews, equipment, or resources, or failure to adhere to the schedule;

b. Demonstrates disregard for the policies, procedures, or requirements of PWC;

c. Demonstrates complete disregard of the authority of PWC or its designated representatives; or

d. Violates in any substantial way the provisions and requirements of this Agreement.

Such termination shall be effective upon written notice to Contractor and its surety. PWC may terminate the contract for its convenience by providing Contractor at least seven (7) calendar days prior written notice, in which event Contractor shall be paid for all Work completed, plus other expenses as mutually agreed upon between PWC and Contractor.

24. Compliance. Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the Work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to Work in the United States, shall verify the Work authorization of the employee through E-Verify in accordance with N.C.G.S. §64-26(a). Contractor hereby pledges, attests, and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2, Chapter 64 of the North Carolina General Statutes and further pledges, attests, and warrants that all subcontractors currently employed by or subsequently hired by Contractor shall comply with all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement. Contractor hereby further acknowledges that the execution and delivery of this Agreement constitutes Contractor's certification to PWC and to the North Carolina State Treasurer that, as of the date of the Effective Date of this Agreement, Contractor is not listed on (a) the Final Divestment List created and maintained by the North Carolina Department of State Treasurer pursuant to the Iran Divestment Act of 2015, Chapter 147, Article 6E of the General Statutes of North Carolina (the "Iran Divestment Act"); or (b) the list of companies that the North Carolina State Treasurer determines to be engaged in a boycott of Israel in accordance with Article 6G of Chapter 147 of the General Statutes of North Carolina. Contractor represents and warrants to Commission that Contractor, and all persons and entities owning (directly or indirectly) an ownership interest in it: (i) are not, and will not become, a person or entity with whom a party is restricted from doing business with under regulations of the Office of Foreign Asset Control ("OFAC") of the Department of the Treasury (including, but not limited to, those named on OFAC's Specially Designated and Blocked Persons list) or under any statute, executive order (including, but not limited to, the September 24, 2001, Executive Order 13224 Blocking Property and Prohibiting Transactions with Persons Who Commit, Threaten to Commit, or Support Terrorism), or other governmental action; and (ii) are not knowingly engaged in, and will not knowingly engage in, any dealings or transactions or be otherwise associated with such persons or entities described in clause (i) above. Contractor also shall at all times during the term of this Agreement comply with Executive Order 11246, including but not limited to the Equal Opportunity Clause requirements set forth in 41 C.F.R. § 60-1.4. Contractor shall abide by the requirements of 41 CFR 60–300.5(a) and 60–741.5(a) prohibiting discrimination against qualified individuals on the basis of protected veteran status or disability and requiring affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and individuals with disabilities.

IN WITNESS WHEREOF, the Parties have executed this Agreement by their duly authorized representatives.

Fayetteville Public Works Commission CONTRACTOR

By:_____
Marion J. Noland, Interim CEO/GM

By:_____
_____
(Printed Name, Title)

Date: _____

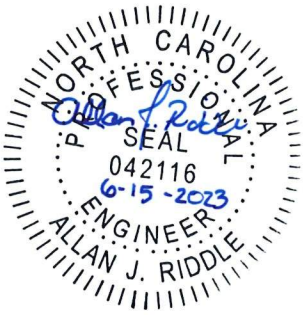
Date: _____

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act (N.C. Gen. Stat. § 159-1 et seq.).

By:_____
Rhonda Haskins, Chief Financial Officer

Approved as to form:

_____
Legal Dept.



PWC
Fayetteville's
HOMETOWN UTILITY

GENERAL CONDITIONS FOR

_____

FOR THE FAYETTEVILLE PUBLIC WORKS COMMISSION

General Conditions

Article I. Definitions and Terminology

Section 1.01 Definitions

Capitalized terms used in the Bid Documents or Contract Documents, including the singular and plural forms, shall have the meaning indicated in the definitions below. In addition to terms specifically defined below, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

(a) Addenda—Written or graphic instruments issued before the opening of Bids which clarify, correct, or change the Bid Documents or other Contract Documents.

(b) Agreement—The written instrument, executed by PWC and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties, designates the specific documents that encompass the Contract Documents, and provides other material provisions that govern the relationship between the parties as it relates to the Project. The Agreement is also referred to, and titled as, the "Construction Agreement."

(c) Application for Payment—The form that Contractor shall use during the Work in requesting progress or final payments. Any Application for Payment shall be accompanied by such supporting documentation as is required by the Contract Documents.

(d) Bid—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

(e) Bidder—An individual or entity that submits a Bid to PWC for the Project.

(f) Bid Documents—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

(g) Bidding Requirements—The Invitation to Bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bidder's original Bid with any requisite attachments.

(h) Business Day—each calendar day that is not a Saturday, Sunday, or holiday observed by PWC (New Year's Day, Martin Luther King, Jr. Day, Good Friday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day (and the day after), and Christmas (2 days) for its employees.

(i) Change Order—A document that is signed by Contractor and PWC, which authorizes an addition, deletion, or revision in the Work, an adjustment in the Contract Price or the Contract Times, a change in the scope of the Project, or other revision to the Agreement, issued on or after the Effective Date of the Agreement.

(j) Change Proposal—A written request by Contractor, submitted in compliance with the procedural requirements set forth in the Contract Documents, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by PWC concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Agreement.

(k) Completion of the Project—Has the meaning as set forth in the Construction Agreement.

(l) Constituent of Concern—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

(m) Contract Price—The money that PWC has agreed to pay Contractor for Completion of the Project in accordance with the Contract Documents. May also be referred to as "Price" throughout the Contract Documents.

(n) Contract Times—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; and (b) Completion of the Project.

(o) Contractor—The individual or entity with which PWC has contracted for performance of the Work and Completion of the Project.

(p) Day—a calendar day of 24 hours measured from midnight to the next midnight. Also referred to throughout the Contract Documents as "days" or "calendar days."

(q) Design Engineer—The Engineering firm identified on the Contract Drawings and their duly authorized employees and agents, such employees and agents acting within the scope of the particular duties entrusted to them in each case.

(r) Drawings—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

(s) Field Order—A written order issued by Project Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

(t) Final Completion—The day the on which any specified Work is complete in accordance with the Contract Documents.

(u) Laws and Regulations; Laws or Regulations—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction. Such terms, unless otherwise specified, shall refer to North Carolina laws and regulations.

(v) Milestone—A principal event in the performance of the Work that the Agreement requires Contractor to achieve by an intermediate completion date or by a time prior to Completion of the Project.

(w) Non-Compliance Notice—A written notice issued by PWC to Contractor indicating a

violation of any term, provision, or requirement of the Contract Documents.

(x) Notice of Award—The written notice by PWC to a Bidder providing of PWC's acceptance of the Bid upon timely compliance by the Bidder with any conditions precedent provided in the notice.

(y) Notice to Proceed—A written notice by PWC to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

(z) Progress Schedule—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

(aa) Project—has the meaning ascribed to it in the Agreement and is as more specifically set forth throughout the Contract Documents. "Project" includes the total undertaking to be accomplished for PWC by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

(bb) Project Engineer—the PWC employee assigned by PWC to coordinate, manage, monitor, and otherwise perform the administration necessary and consistent with PWC's responsibilities for the Completion of the Project. The Project Engineer has authority to coordinate and work with the Design Engineer regarding any engineering questions, concerns, revisions, alterations, deletions, or additions to the Work, and has authority to approve any changes in the scope of the Work. Project Engineer may assign a "Project Coordinator" who will also be an employee of PWC and have the duties and responsibilities set by the Project Engineer.

(cc) PWC—Fayetteville Public Works Commission. PWC may also be referred to in the Contract Documents as "Owner."

(dd) Samples—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

(ee) Schedule of Submittals—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Project Engineer's review of the submittals and the performance of related construction activities.

(ff) Schedule of Values—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

(gg) Shop Drawings—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Contract Drawings and are not Contract Documents.

(hh) Site—Lands or areas indicated in the Contract Documents as being furnished by PWC upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by PWC which are designated for the use of Contractor.

(ii) Specifications—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

(jj) Subcontractor—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

(kk) Substantial Completion—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Project Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

(ll) Successful Bidder—The Bidder whose Bid PWC accepts, and to which PWC provides a Notice of Award.

(mm) Supplementary Conditions—Any part of the Agreement that amends or supplements these General Conditions.

(nn) Supplier—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

(oo) Technical Data—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

(pp) Underground Facilities—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

(qq) Unit Price Work—Work to be paid for on the basis of unit prices.

(rr) Work—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, materials, equipment, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents and necessary to achieve Completion of the Project.

(ss) Work Change Directive—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by PWC and recommended by the Project Engineer, ordering an addition, deletion, or revision in the Work.

Section 1.02 Terminology

The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

(a) Intent of Certain Terms or Adjectives:

(i) The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Project Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Project Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Project Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions the Contract Documents.

(b) Defective—when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

(i) does not conform to the Contract Documents; or
(ii) does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
(iii) has been damaged prior to Project Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by PWC at Substantial Completion in accordance with the Contract Documents).

(c) Furnish, Install, Perform, Provide

(i) The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
(ii) The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
(iii) The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
(iv) If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

Article II. Preliminary Matters

Section 2.01 Delivery of Bonds and Evidence of Insurance

(a) Bonds: Contractor shall deliver to PWC such bonds as Contractor is required to furnish simultaneously with delivering the executed Agreement to PWC.

(b) Contractor's Insurance: Contractor shall deliver to PWC the certificates and other evidence of the insurance required by the Contract Documents simultaneously with delivering the executed Agreement to PWC.

Section 2.02 Copies of Documents

(a) PWC will furnish to Contractor up to five (5) printed copies of the Contract Documents upon request by Contractor, and one (1) copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

(b) PWC will maintain and safeguard at least one original printed record version of the Agreement, including Drawings and Specifications signed and sealed by Design Engineer or other design professionals as applicable. PWC agrees to make such original printed record version of the Agreement reasonably available to Contractor for review during PWC's normal business hours. PWC may delegate the responsibilities under this provision to Design Engineer.

Section 2.03 Before Starting any Work

(a) Within ten (10) Days after the Contractor receives the Notice of Award from PWC (or as otherwise specifically required by the Contract Documents), Contractor shall submit to PWC for timely review:

(i) a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the identifiable aspects of the Work, including any Milestones specified in the Contract Documents;
(ii) a preliminary Schedule of Submittals; and
(iii) Any Shop Drawings, Samples, and other submittals required by the Contract Documents before the Preconstruction Conference.

Section 2.04 Preconstruction Conference; Designation of Authorized Representatives

(a) Before any Work at the Site is started, a preconstruction conference attended by PWC, Project Engineer, Contractor, Design Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss general Project issues including, but not limited, the following:
(i) The schedules and submittals referred to in Section 2.03;
(ii) Contractor's designated authorized representative as described in Section 2.04(b);
(iii) Safety;
(iv) Procedures for handling Shop Drawings, Samples, and other submittals;

(v) Processing Applications for Payment, electronic or digital transmittals;

(b) At the preconstruction conference Contractor shall designate, in writing, a specific individual to act as its authorized representative with respect to its services and responsibilities under the Contract Documents. Such individual shall have the authority to transmit and receive information, render decisions relative to the requirements of the Contract Documents, and otherwise act on behalf of the Contractor.

Section 2.05 Initial Acceptance of Schedules

(a) At least twenty (20) Days before submission of the first Application for Payment a conference, attended by Contractor, PWC, and others as appropriate, will be held to review for acceptability to Project Engineer as provided below the schedules submitted in accordance with Paragraph 2.03(a). PWC shall have ten (10) Days to review the submission and provide feedback to Contractor. Contractor shall then have ten (10) days to make any corrections and adjustments as indicated by PWC and to complete and resubmit the schedules as necessary. No progress payment shall be made to Contractor until acceptable schedules are submitted to and approved by Project Engineer.

(b) The Progress Schedule will be acceptable to Project Engineer if it provides an orderly progression of the Work to achieve Completion of the Project within the Contract Times. Such acceptance will not impose on Project Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

(c) Contractor's Schedule of Submittals will be acceptable to Project Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

Section 2.06 Electronic Transmittals

(a) Except as otherwise stated elsewhere in the Contract Documents, PWC and Contractor and their authorized agents may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through electronic mail at the address(es) designated by each Party.

(b) When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

Article III. Contract Documents: Intent, Requirements, Reuse

Section 3.01 Intent

(a) The Contract Documents are complementary; what is required by one is as binding as if required by all.

(b) It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

(c) Project Engineer, Design Engineer, or both, will issue clarifications and interpretations of the Contract Documents as provided herein.

(d) To the extent necessary that Work, construction, or conditions not covered by these General Conditions is required for Contractor to achieve Completion of the Project, "Special Conditions" for such Work will be provided to Contractor and shall be part of the Contract Documents.

(e) In case of any inconsistency, conflict, or ambiguity among the Contract Documents, the documents shall govern in the following order: (1) Change Orders; (2) Addenda; (3) the fully executed Agreement; (4) Special Conditions; (5) any Drawings and Technical Specifications; and (6) General Conditions.

Section 3.02 Reference Standards

(a) Standards Specifications, Codes, Laws and Regulations

(i) Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or North Carolina laws and regulations in effect as of the Effective Date of the Agreement, except as may be otherwise specifically stated in the Contract Documents.

(ii) No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of PWC or Contractor, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to PWC or any of its officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents.

Section 3.03 Reporting and Resolving Discrepancies

(a) Contractor's Verification of Figures and Measurements

(i) Before undertaking any portion of the Work, Contractor shall review all of the Contract Documents to and check and verify all figures and dimensions for the Project. Contractor shall promptly report in writing to Project Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Project Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to these General Conditions.

(ii) If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Project Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as defined hereinafter) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification

or interpretation by Project Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to these General Conditions.

(b) Resolving Discrepancies:

(i) Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for PWC shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

1) the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
2) the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

Section 3.04 Reuse of Documents

(a) Contractor and its Subcontractors and Suppliers shall not have or acquire any title to or ownership rights in any of the:

(i) Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Design Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of PWC and Design Engineer and specific written verification or adaptation by Design Engineer, where applicable; or
(ii) Contract Documents and shall not reuse any such Contract Documents for any purpose without PWC's express written consent.

(b) The prohibitions of this provision shall survive final payment or termination of the Agreement. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

Article IV. Commencement and Progress of the Work

Section 4.01 Commencement of Work

(a) The Contract Times will commence to run on the day indicated in the Notice to Proceed issued by PWC to Contractor. A Notice to Proceed may be given at any time after the Effective Date of the Contract.

(b) Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date. Contractor's failure to commence the Work within fifteen (15) Days of the date stated in the Notice to Proceed shall be deemed a material breach of the Agreement unless PWC otherwise determines in its sole discretion and agrees in writing to a delay of the Contract Times based on the applicable circumstances.

Section 4.02 Reference Points

(a) Construction staking will be performed by Design Engineer, who will also prepare and furnish construction cut sheets, signed and sealed by a North Carolina professional land surveyor, to PWC and Contractor. Contractor shall not install any utilities without a sheet. All requests for staking shall be made not less than 96 hours in advance.

(b) Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and staking, and shall make no changes or relocations without the prior written approval of Project Engineer. Contractor shall report to Project Engineer whenever any reference point staking is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or staking by professionally qualified personnel.

Section 4.03 Progress Schedule

(a) Contractor shall adhere to the Progress Schedule established in accordance with Section 2.03 as it may be adjusted from time-to-time as provided below. Contractor shall submit to Project Engineer for acceptance any proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article IX.

(b) Contractor shall carry on the Work and adhere to the Progress Schedule during any disputes or disagreements with PWC. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by these General Conditions or as PWC and Contractor may otherwise agree in writing.

Section 4.04 Delays in Contractor's Progress

(a) If PWC, Project Engineer, anyone for whom PWC is responsible, or a Force Majeure Event delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

(b) Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

(c) Contractor must submit any Change Proposal, consistent with the procedure set forth in Article IX, seeking an adjustment in Contract Price or Contract Times under this provision within ten (10) calendar days of the commencement of the event that causes the delay, disruption, or interference with the Work and Contract Times.

Article V. Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions

Section 5.01 Availability of Lands

(a) PWC will be responsible for obtaining any required easements and encroachments, and otherwise furnishing the Site, necessary to complete the Work, except as provided elsewhere in the Contract Documents.

(b) Upon reasonable written request, PWC shall furnish to Contractor a current statement of record legal title and legal description of the lands upon which the Work is to be completed and PWC's interest therein.

(c) Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment necessary to complete the Work. Any and all agreements between the Contractor and any individual property owner(s) shall not obligate PWC, PWC's employees, Project Engineer, or Design Engineer in any manner, and Contractor shall, before performing any work on any such property, obtain a signed and notarized release of liability of PWC and Design Engineer that is suitable to PWC as confirmed in writing.

(d) Contractor and any of its Subcontractors shall exercise care and caution to avoid damage to any private property. Should any such damage to private property occur, it is Contractor's responsibility to notify the Project Engineer promptly in writing that such damage occurred, the extent of the damage, and Contractor's written plan to remedy the damage. If Contractor fails to timely correct damage to private property, PWC reserves the right to withhold progress payments until damage is corrected and/or to correct damage and back-charge Contractor for costs incurred. At the Completion of the Project, Contractor shall obtain a signed release from all owners of private property to which damage occurred that releases PWC and Design Engineer and acknowledges a settlement for the damage or that such damage was adequately remedied.

Section 5.02 Use of Site and Other Areas

(a) Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site and other adjacent areas permitted by Laws and Regulations and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

(b) Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris during the progress of the Work. Removal and disposal of such debris shall conform to applicable Laws and Regulations.

(c) Prior to Completion of the Project, Contractor shall clean the Site and the Work and make it ready for utilization by PWC. At the completion of all of the Work, Contractor shall remove

from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

(d) Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

Section 5.03 Differing Subsurface or Physical Conditions or Underground Facilities

(a) If Contractor believes that any subsurface or physical condition or Underground Facilities that is uncovered or revealed at the Site either:

(i) is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely is materially inaccurate;
(ii) is of such a nature as to require a change in the Contract Documents;
(iii) differs materially from that shown or indicated in the Contract Documents; or
(iv) is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or Underground Facilities or performing any Work in connection therewith, notify PWC and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement approved by PWC permitting Contractor to do so.

(b) After receipt of Contractor's written notice, Project Engineer will review the subsurface or physical condition or Underground Facilities in question; determine the necessity of PWC obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any of the differing site condition categories in this Section5.03; and obtain any pertinent cost or schedule information from Contractor.

(c) Project Engineer will issue a written statement to Contractor regarding the subsurface or physical condition or Underground Facilities in question, which addresses the resumption of Work in connection with such condition and indicates whether any change in the Contract Documents will be made.

(d) Possible Price and Times Adjustments:

(i) Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition or Underground Facilities, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

1) such condition must fall within at least one of the categories in this Section 5.03; and,
2) Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

(ii) Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition or Underground Facilities if:

1) Contractor knew of the existence of such condition at the time Contractor proffered its Bid to PWC or executed the applicable Agreement for the Project; or
2) the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's Bid; or
3) Contractor failed to give the written notice as required.

(iii) If PWC and Contractor agree regarding Contractor's entitlement to, and the amount or extent of, any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

(iv) Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 calendar days after Project Engineer's written statement to Contractor regarding the subsurface or physical condition or Underground Facilities in question.

Section 5.04 Underground Utilities

(a) Contractor shall ascertain the location and type of all underground utility lines or structures that may be located within the limits of the Site or any area where Work is to be performed.

(i) The exact location of underground utilities or structures may vary from prior plans, permits, maps, or other documentation, and others may not be designated. The Contractor is fully responsible for verification of the exact location of all underground utility lines or structures within the limits of the Site or the area where the work is to be performed, whether known or unknown by PWC, and for providing necessary protection and/or repair if damage.

(ii) Should uncharted or incorrectly charted piping or other utilities be encountered during excavations, the Contractor shall immediately halt any Work, notify PWC, and await direction from PWC before proceeding with any Work. The Contractor shall fully cooperate with PWC and any other utility company in keeping respective services and facilities in operation.

(b) PWC has used reasonable care to locate and depict existing underground installation on the construction drawings, but the accuracy cannot be guaranteed, and some items may not be shown which exist. Actual horizontal and vertical locations have not been verified. As part of the Work, the Contractor is required to dig up each utility which may conflict with construction in advance to verify locations. The utilities shall be "dug up" a minimum of fourteen (14) Days in advance of actual installation of new utilities to allow PWC an opportunity to adjust grades and alignments, to avoid a conflict, and to address any other issues.

(c) The Contractor shall adhere to the provisions of the North Carolina Underground Utility Safety and Damage Prevention Act. The Contractor shall make a documented request to

the North Carolina One Call Center, and/or individual utility owners, in order to locate any facilities within the Site limits or any area where Work is to be performed at least forty-eight (48) hours in advance of the day the Work is scheduled to begin. The Contractor shall include the cost of any coordination and cooperation for utilities in its Bid.

(i) Location assistance requested from PWC by Contractor should include the actual horizontal location, type number, size, and depth of all lines. All costs associated with locating and marking existing utilities or the utilities representatives shall be the responsibility of the Contractor.

(ii) The Owner, Project Engineer, Design Engineer, and/or Consultants shall not be liable to the Contractor for any claims, costs, losses, or damages incurred or sustained on or in connection with locating existing underground installations.

(d) If the Contractor fails to schedule locates or perform advance physical locations in advance of the construction and a conflict arises, the Contractor will be required to make corrective measures as instructed by the Project Engineer at the Contractor's expense. The Contractor's failure to advance plan (minimum fourteen (14) days) by physically uncovering existing utilities in advance of construction shall not be cause for claim of lost time or for additional compensation. No additional payment will be made for re-mobilization required by the utility locator.

(i) The Contractor shall inform all equipment operators, either those employed by him or those employed by his subcontractors, of information obtained from the utility owners prior to initiation of any aspect of any Work.

(e) PWC and Design Engineer shall not be responsible for the accuracy or completeness of any information or data provided to the Contractor with respect to underground facilities.

(f) The entire cost of all of the following will be included in the Contract Price, and Contractor shall bear full responsibilities for all such costs, including but not limited to:

(i) Reviewing and checking all such information and data;

(ii) Locating all underground facilities shown or indicated in the Contract Documents;

(iii) Coordination of the Work with the owners of such underground facilities, including PWC, during any portion of the Work; and

(iv) The safety and protection of all such underground facilities and repairing any damage thereto resulting from the Work.

(g) Contractor shall be responsible for the discovery of existing underground installations, in advance of any excavating or trenching as required in the Contract Documents.

(h) If an underground facility is discovered at or contiguous to the Site that was not shown or indicated in the Contract Documents or of which Contractor was not aware prior to starting that portion of any Work, Contractor shall, immediately after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in

connection therewith (except in an emergency), identify the owner of such underground facility and give written notice to PWC. Upon receipt of written notice, PWC will review the pertinent condition, determine the necessity of obtaining additional information, and advise Contractor in writing. During such time, Contractor shall be responsible for the safety and protection of such underground facility. If PWC concludes that a change in the Contract Documents is required, a Change Order will be issued.

(i) The Contract Price and/or the Contract Time, may be adjusted if PWC determines, in its discretion, that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work subject to the following:

1) Facility was not shown or indicated in the Contract Documents, and
2) The Contractor did not know of or could not anticipate the facility.

Section 5.05 Hazardous Environmental Conditions at Site

(a) Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work or Hazardous Environmental Condition was caused by Contractor.

(b) Contractor shall be responsible for controlling, containing, and removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

(c) If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency); and (3) immediately notify Project Engineer (and promptly thereafter confirm such notice in writing). Project Engineer will evaluate such condition or take corrective action, if any. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then PWC may have the Hazardous Environmental Condition removed and remediated and impose a set-off against payments to Contractor to account for the reasonable associated costs.

(d) Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after PWC has delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

(e) If PWC and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within thirty (30) calendar days of PWC's written notice regarding the

resumption of Work, Contractor may submit a Change Proposal or PWC may impose a set-off.

(f) If after receipt of such written notice Contractor does not agree to resume such Work based on reasonable evidence it is unsafe or does not agree to resume such Work under such special conditions, then PWC may order the portion of the Work that is in the area affected by such condition to be deleted from the Work.

Article VI. Bonds and Insurance

Section 6.01 Performance and Payment Bonds

(a) Contractor shall obtain and furnish to PWC a performance bond in the amount of one hundred percent (100%) of the Contract Price, conditioned upon the faithful performance of the Project and all Work in accordance with the Contract Documents, which bond shall be solely for the protection of PWC.

(b) Contractor shall obtain and furnish to PWC a payment bond in the amount of one hundred percent (100%) of the Contract Price, conditioned upon the prompt payment for all labor or materials for which the Contractor or one or more of its subcontractors is liable, which payment bond shall be solely for the protection of the persons furnishing materials or performing labor for which the Contractor is liable.

(c) The performance bond and the payment bond shall be executed by one or more surety companies legally authorized to do business in the State of North Carolina, shall become effective upon the awarding of the construction contract by PWC to Contractor, and shall at all times comply with the requirements set forth in Article 3 of North Carolina General Statutes Chapter 44A.

(d) In the event PWC deems the surety or sureties upon any bond necessary for the Agreement and the completion of the Project, or if for any reason, such bond ceases to be adequate to cover the performance and/or payment of the Work, Contractor shall, at its expense, and within ten (10) days after the receipt of notice from PWC, furnish such additional bond(s) in such form and amount, and with such surety or sureties, as shall be satisfactory to PWC. In such event no further payment to Contractor shall be deemed to be due under this Agreement until new or additional security for the performance and payment of the Project shall be furnished in manner and form satisfactory to PWC.

(e) By executing the Agreement, Contractor understands and acknowledges that PWC, as a public authority, and the City, as a municipal corporation, are not subject to the provisions of Articles 1 and 2 of Chapter 44A of the General Statutes, in accordance with G.S. 44A-34 and applicable law.

Section 6.02 Insurance

(a) Contractor shall maintain during the life of the Agreement and during the completion of any Work the following insurance coverages, which insurance shall be placed with insurance companies authorized to do business in the State of North Carolina and rate A minus VII or better by the current edition of Best's Key Rating Guide or otherwise approved in writing by PWC:

(i) Commercial general liability insurance with limits of $1,000,000 per occurrence, $2,000,000 aggregate other than products/completed operations; $2,000,000 aggregate for products/completed. Commercial general liability coverage shall be written on an "occurrence" basis.

(ii) Automobile liability insurance in an amount not less than $1,000,000 combined single limit per accident for bodily injury and property damage from owned, non-owned, and hired automobiles.

(iii) Workers' compensation insurance as required by the Laws and Regulations. In the event any employee(s), contractor(s), or subcontractor(s) engaged to perform any Work under the Agreement is not protected under the applicable workers' compensation laws, the Contractor shall provide adequate coverage for the protection of such employee(s), contractor(s), or subcontractor(s) not otherwise protected.

(iv) In the event the Project concerns building construction or repair work, Contractor shall purchase and maintain "Builder's Risk" insurance. This insurance shall include the interests of the PWC, Contractor, and any Subcontractor(s) and shall be written on a one hundred percent (100%) completed value basis (full value as of the date that all construction is finished and includes the Contractor's Contract Price), and to remain in force until Completion of the Project.

(v) Regardless of the nature of the work to be performed, coverage must also be provided for the theft or damage of building materials and supplies, which are not permanently attached or stored on Site for any period of time. This coverage shall be an "Installation Floater." If no building construction or repair is involved for the Project, the amount of the coverage shall equal the value of the materials stored on site.

(b) Prior to initiating any Work on the Project, Contractor shall deliver certificates of insurance confirming each such coverage set forth above, and Contractor shall direct its insurers to provide annually to PWC certificates confirming each such coverage during the coverage period.

(c) PWC shall be named as an additional insured in the comprehensive automobile and commercial liability insurance policies.

(d) Contractor shall not reduce or allow the required insurance coverages to lapse without PWC's prior written approval. All policies for insurance must be endorsed to contain a provision giving PWC a thirty (30) calendar day prior written notice by certified mail of any cancellation of that policy or material reduction in coverage. Should a notice of cancellation be issued for non-payment of premiums or any part thereof, or should Contractor fail to provide and maintain certificates as set forth herein, PWC shall have the right, but shall not have the obligation, to pay such premium to the insurance company or to obtain such coverage and to deduct such payment from any sums that may be due or become due to Contractor, or to seek reimbursement for said payments from Contractor. Any such sums paid by PWC shall be due and payable immediately by Contractor upon notice from PWC.

(e) The insurance coverage requirements shall not be construed as a limitation on Contractor's responsibilities and liabilities pursuant to the terms and conditions of this Agreement. Contractor's obligation to maintain insurance for three (3) years after Completion of the Project shall survive the termination of this Agreement.

(f) If Contractor fails to obtain and maintain any required insurance, PWC may exclude Contractor from the Site, impose an appropriate set-off against payment, and exercise PWC's termination rights pursuant to the Contract Documents.

(g) PWC does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

Article VII. Contractor's Responsibilities

Section 7.01 Supervision and Superintendence

(a) Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction subject to the terms, provisions, and specifications set forth in the Contract Documents.

(b) At all times during the progress of the Work, Contractor shall assign a competent superintendent, satisfactory to Project Engineer, to supervise the Work and to respond to Project Engineer concerning PWC's interests in the Work.

(c) Contractor's superintendent shall have full authority to act on behalf of Contractor and all communications, instructions, directions, and notices given to the superintendent by the Project Engineer shall be binding to the Contractor.

(d) Contractor's superintendent shall be responsible for coordination of the Work with other contractors or subcontractors. The superintendent shall not be replaced without written notice to PWC except under extraordinary circumstances.

(e) Subcontractors

(i) Contractor shall submit the names and references all Subcontractors to the Project Engineer for approval before commencing any Work.

1) In the event Contractor seeks to substitute any Subcontractor that was identified in Contractor's Bid, Contractor shall promptly provide PWC with: (1) the Subcontractor it seeks to substitute; (2) the identity of the Subcontractor to be substituted; and (3) the reason for the requested substitution.

2) PWC will review the requested substitution within five (5) Business Days and provide written approval or denial of the substitution, with such approval not to be unreasonably withheld.

(ii) Contractor's superintendent shall be available to be present at the Site at any time that any Subcontractor(s) is performing any of the Work. Construction activity shall be stopped if the Contractor's superintendent is not available to be at the Site.

Section 7.02 Labor; Working Hours

(a) Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site. Contractor shall remove from the Project any person who appears incompetent, disorderly, or otherwise unsatisfactory. Contractor shall also remove any person who appears in PWC's sole discretion to be incompetent, disorderly, or otherwise unsatisfactory

(b) Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed on Business Days. Contractor will not perform Work on non-Business Days. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with PWC's written consent, which will not be unreasonably withheld. In such circumstances, Contractor shall submit a written request to PWC at least two (2) Business Days prior to any Work that it requests to complete on a non-Business Day and PWC will, in its sole discretion, approve or deny such request. If such work outside of a Business Day is approved, PWC will set forth the specific parameters that Contractor must follow, including time of work, personnel, and any other issues.8

Section 7.03 Services, Materials, and Equipment

(a) Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and Completion of the Project, whether or not such items are specifically called for in the Contract Documents.

(b) All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise specified in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of PWC. If required by PWC or its designee, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

(c) All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be specified in the Contract Documents.

Section 7.04 "Or Equals"

(a) Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Project Engineer authorize the use of other items of material or equipment under the circumstances described below.

(i) If Project Engineer determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in

related Work will be required, Project Engineer shall deem it an "or equal" item and confirm such in writing to Contractor. A proposed item of material or equipment will be considered functionally equal to an item so named if:

1) in the exercise of reasonable judgment Project Engineer determines that:

   a) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
   b) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
   c) it has a proven record of performance and availability of responsive service; and
   d) it is not objectionable to PWC.

2) Contractor certifies that, if approved and incorporated into the Work:

   a) there will be no increase in the Contract Price or Contract Times; and
   b) it will conform substantially to the detailed requirements of the item specified in the Contract Documents.

(b) Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

(c) Project Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Project Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Project Engineer will be the sole judge of acceptability. Contractor shall not order, furnish, install, or utilize any "or-equal" it until Project Engineer has reviewed the request, determined that the proposed item is an "or-equal," and provided written confirmation to Contractor.

(d) Project Engineer's denial of an "or-equal" request shall be final and binding and may not be reversed through an appeal under any provision of the Contract Documents.

Section 7.05 Concerning Subcontractors, Suppliers, and Others

(a) Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to PWC.

(b) Contractor shall not subcontract more than forty-nine percent (49%) of the final Contract Price.

(c) Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract Documents.

(d) After the submittal of Contractor's Bid or final negotiation of the terms of the Agreement, PWC may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work.

(e) Prior to entry into any binding subcontract or purchase order, Contractor shall submit to PWC the identity of the proposed Subcontractor or Supplier (unless PWC has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to

PWC unless PWC raises a substantive, reasonable objection within five (5) Business Days.

(f) No acceptance by PWC of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of PWC to the completion of the Work in accordance with the Contract Documents.

(g) Contractor shall be fully responsible to PWC for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

(h) Contractor shall be solely responsible for scheduling and coordinating the Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

(i) Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with PWC, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

(j) All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of PWC.

(k) PWC may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

(l) Nothing in the Contract Documents:

(i) shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between PWC or Design Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

(ii) shall create any obligation on the part of PWC or Design Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

Section 7.06 Patent Fees and Royalties

(a) Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device that is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of PWC, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by PWC in the Contract Documents.

Section 7.07 Permits

(a) Unless otherwise specified in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses necessary to achieve Completion of the Project. Contractor shall timely seek assistance from PWC if necessary to obtain any permits or licenses; provided that, the Contract Time shall not be extended if PWC determines, in its

discretion, that Contractor delayed or otherwise did not act expeditiously in requesting such assistance. PWC shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for Completion of the Project that are applicable at the time of the submission of Contractor's Bid.

Section 7.08 Taxes

(a) Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the applicable Laws and Regulations for the Project and which are applicable during the performance of the Work.

Section 7.09 Laws and Regulations

(a) Contractor shall give all notices required by, and shall comply with, all Laws and Regulations applicable to the Project. Except as otherwise expressly required, PWC shall not be responsible for monitoring Contractor's compliance with any Laws or Regulations.

(b) Contractor shall bear all resulting costs and losses for any of its actions or inactions that are contrary to Laws or Regulations.

(c) PWC or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under the Agreement) concerning any Laws or Regulations having an effect on the Contract Price or Contract Times, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If PWC and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 calendar days of such notice Contractor may submit a Change Proposal.

Section 7.10 Record Documents

(a) Contractor shall maintain in good order one (1) printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. These record documents, together with all approved Samples, will be available to Project Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to PWC.

Section 7.11 Safety and Protection

(a) Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

(i) all persons on the Site or who may be affected by the Work;
(ii) all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
(iii) other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks,

pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

(b) Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify PWC, the owners of adjacent property or Underground Facilities, and other contractors and owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

(c) Contractor shall comply with the requirement of any of PWC's applicable health programs, which may be revised from time to time based on specific circumstances or applicable guidance from the Center for Disease Control or other applicable entity. Such health programs will be identified in the Special Conditions if applicable to the Project.

(d) Contractor shall comply with the requirements of PWC's applicable safety programs. The Special Conditions identify any of PWC's safety programs that are applicable to the Project.

(e) Contractor shall remedy, at its expense, all damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

(f) Contractor's duties and responsibilities for safety and protection shall continue until such time as Completion of the Project is achieved.

(g) Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

(h) Contractor shall designate in writing to PWC a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

Section 7.12 Emergencies

(a) In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to, and shall, act to prevent threatened damage, injury, or loss. Contractor shall give PWC prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused or are required as a result of any emergency. If PWC determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

Section 7.13 Shop Drawings, Samples, and Other Submittals

(a) Contractor shall timely submit Shop Drawings and Samples required by the Contract Documents to Project Engineer for review and approval in accordance with applicable

specifications.

(b) Before submitting a Shop Drawing or Sample, Contractor shall have

(i) reviewed the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
(ii) verified all measurements, quantities, dimensions, performance and design criteria, installation requirements, materials, catalog numbers, and similar information;
(iii) verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
(iv) verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

(c) With each submittal, Contractor shall give Project Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to PWC for review and approval of each such variation.

(d) Where a Shop Drawing or Sample is required by the Contract Documents, any related Work performed prior to Project Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

(e) Project Engineer will provide timely review of any required Shop Drawings and Samples. Such review, and subsequent determination of approval, will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

(f) Project Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

(g) Project Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not change the Contract Times or Contract Price, unless such changes are included in a Change Order.

(h) Project Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall not result in such item becoming a Contract Document.

(i) Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples.

(j) Resubmittal Procedures:

(i) Contractor shall make corrections required by Project Engineer and shall return the required number of corrected copies of Shop Drawings and submit new Samples as required for review and approval. Contractor shall direct specific attention in writing to

revisions other than the corrections called for by PWC or Project Engineer on previous submittals.

(ii) Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three (3) submittals. If PWC has engaged a Design Engineer for the Project, Design Engineer will record Design Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Design Engineer's charges to PWC for such time. PWC may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

(iii) If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Design Engineer's charges to PWC for its review time, and PWC may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

Section 7.14 Contractor's General Warranty and Guarantee

(a) In order to induce PWC to enter into an Agreement with Contractor for the Project, Contractor warrants and guarantees to PWC that:

(i) Contractor is duly licensed in the State of North Carolina to complete all Work necessary for the Project, is duly organized, validly existing and in good standing and has all requisite powers, rights, and authority to execute, enter into, and perform the Agreement in accordance with the terms and conditions of the Agreement, and the Agreement constitutes a legal, valid, and binding obligation of Contractor enforceable against it in accordance with its terms.

(ii) Contractor has read the Contract Documents, and acknowledges and understands all data, materials, specifications, and requirements identified in the Contract Documents.

(iii) Contractor has visited the site for the Project, conducted a thorough, visual examination of the site and adjacent areas, and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance in completing the Project.

(iv) Contractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance to complete the Project.

(v) Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the site and all drawings of physical conditions relating to existing surface or subsurface structures at the site that have been identified in the Detail Specifications and any accompanying reports and drawings, and (2) reports and drawings relating to hazardous environmental conditions, if any, at or adjacent to the site that have been identified in the Contract Documents and any accompanying reports and drawings.

(vi) Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, if any, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

(vii) Based on the information and observations referred to in subsection "(v)" of this Section, Contractor agrees that no further examinations, investigations, explorations, tests,

studies, or data are necessary for the performance of the Work at the Contract Price and in accordance with the other terms and conditions of the Contract Documents.

(viii) Contractor is aware of the general nature of work to be performed by PWC and others at the Site that relates to the Work as indicated in the Contract Documents.

(ix) Contractor has given PWC written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by PWC is acceptable to Contractor.

(x) The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

(xi) Contractor's entry into this Agreement constitutes an incontrovertible representation by Contractor that, without exception, all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

(xii) Contractor has no business or personal relationship with any PWC Commissioner, officer, director, manager, or supervisor and Contractor covenants to disclose immediately to PWC any such relationship that develops during the performance of Work on the Project.

(b) Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

(i) observations by Project Engineer;
(ii) recommendation by Project Engineer or payment by PWC of any progress or final payment;
(iii) the issuance of a certificate of Substantial Completion by Project Engineer or any payment related thereto by PWC;
(iv) use or occupancy of the Work or any part thereof by PWC;
(v) any review and approval of a Shop Drawing or Sample submittal;
(vi) the issuance of a notice of acceptability by Project Engineer;
(vii) any inspection, test, or approval by others; or
(viii) any correction of defective Work by PWC.

(c) If the Contract Documents requires the Contractor to accept the assignment of a contract entered into by PWC, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to PWC for the Work described in the assigned contract.

Section 7.15 Indemnification

(a) Contractor shall indemnify, defend, and hold harmless PWC and its Commissioners, officers, employees, agents, and representatives and the City and its elected officials, managers, employees, agents, and representatives and Design Engineer (collectively "Indemnitees") from and against all claims, actions, liabilities, damages, losses, costs, and expenses (including, without limitation, injury to or death of any persons and damage to property, economic and consequential damages and attorneys' fees) asserted by one or more third parties against one or more of the Indemnitees if the Fault of one or more Responsible Persons is a proximate cause of the loss, damage, or expense indemnified.

(b) Contractor's obligation to indemnify, defend, and hold harmless the Indemnitees shall survive the termination of the Agreement.

(c) In any and all claims against the Indemnitees of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, Contractor's indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

Section 7.16 Claims Procedure

(a) PWC shall notify the Contractor of all potential claims related to the Work within seven (7) calendar days of receiving notification or having knowledge of such potential claim. Should the Contractor receive a potential claim related to the Work, the Contractor shall notify PWC within seven (7) calendar days of receiving notification. The Contractor shall provide the claimant and PWC with a written response acknowledging receipt of the claim within seven (7) calendar days.

(b) If the Contractor meets with the Claimant about the claim, a representative designated by PWC shall be present at all times. PWC shall maintain a record of any claim received, and the steps taken to resolve. PWC shall also concurrently investigate each case. The Contractor agrees to furnish PWC any information regarding the claim, the actions which led to the claim and/or the investigation of the claim. Contractor shall provide their proposed response to PWC within thirty (30) calendar days of receiving the claim. Upon receipt of the response PWC and the Contractor will discuss and reach a mutual agreement of the response necessary to send to the Claimant within fifteen (15) calendar days. Once the agreement is made the Contractor shall make a formal written resolution to the claimant.

(c) Failure to act in good faith or respond to a claim in the timelines established by the Contract Documents will constitute a lack of response by the Contractor, therefore validating the claim. PWC will deduct the total amount of the claim from the monthly pay application. Failure to comply with the above requirements for resolving claims may, at the sole discretion of PWC, result in breach of contract.

(d) The Contractor is aware of these claims procedures and understands that it is the PWC's practice to pursue reimbursement/subrogation for any and all claims related expenses, which are incurred as a result of the Contractor's performance under this Contract Documents and allowed within the applicable statute of limitations.

Section 7.17 Delegation of Professional Design Services

(a) Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

(b) If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, PWC will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed

professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to PWC.

(c) PWC shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided PWC has specified to Contractor all performance and design criteria that such services must satisfy.

(d) Pursuant to this Section, PWC's, or its designee's, review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. PWC specifically retains final approval of such submittals.

(e) Contractor shall not be responsible for the adequacy of the performance or design criteria specified by PWC.

Article VIII. PWC's Responsibilities

(a) In awarding the bid to Contractor and executing the applicable Agreement, PWC acknowledges the following responsibilities:

(i) Except as otherwise provided in these General Conditions, PWC shall issue all communications directly to Contractor or its designee.
(ii) PWC may at its discretion replace Design Engineer and Project Engineer. The replacement Design Engineer or Project Engineer's status under the Contract Documents shall be that of the former Design Engineer or Project Engineer.
(iii) PWC shall promptly furnish the data required of PWC under the Contract Documents.
(iv) PWC shall make payments to Contractor when they are due as provided in the Contract Documents.
(v) PWC shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. PWC will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
(vi) Upon request of Contractor, PWC shall furnish to Contractor reasonable evidence that financial arrangements have been made to satisfy PWC's obligations under the Contract Documents (including obligations under proposed changes in the Work).
(vii) While at the Site, PWC's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which PWC has been informed.
(viii) PWC shall furnish copies of any applicable PWC safety program(s) to Contractor, which Contractor shall review and implement.

Amending the Contract Documents; Changes in the Work

Section 8.02 Amending and Supplementing Contract Documents

(a) The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

(i) Change Orders: If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

(ii) Work Change Directives: A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 9.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. PWC must submit any dispute or request seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

(iii) Field Orders: Project Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on PWC and on Contractor, which shall perform promptly the Work involved. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

Section 8.03 PWC-Authorized Changes in the Work

(a) Without invalidating the Agreement and without notice to any surety, PWC may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Design Engineer's recommendation when applicable and to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work as revised. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

Section 8.04 Unauthorized Changes in the Work

(a) Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented.

Section 8.05 Change of Contract Price

(a) The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of these General Conditions.

(b) An adjustment in the Contract Price will be determined as follows:

(i) where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved; or
(ii) where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit as agreed to in writing by the Parties); or
(iii) where the Work involved is not covered by unit prices contained in the Contract Documents and the Parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work plus a reasonable Contractor's fee for overhead and profit.

(c) Contractor's Fee: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

(i) a mutually acceptable fixed fee; or
(ii) if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

1) for unit prices, the Contractor's fee shall be fifteen percent (15%);
2) for all other costs incurred, the Contractor's fee shall be five percent (5%);
3) the amount of credit to be allowed by Contractor to PWC for any change that results in a net decrease in the Contract Price will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
4) when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change.

Section 8.06 Change of Contract Times

(a) The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 9.06.

(b) An adjustment of the Contract Times shall be subject to the limitations set forth in these Contract Document as it concerns delays in Contractor's progress.

Section 8.07 Change Proposals

(a) Contractor shall submit a Change Proposal to PWC to request an adjustment in the Contract Times and/or Contract Price. The Change Proposal shall specify any proposed

change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

(i) Procedures: Contractor shall submit each Change Proposal to PWC promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to PWC within 15 calendar days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

(ii) PWC Action: PWC will review each Change Proposal and, within 30 calendar days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing to Contractor. If PWC does not take action on the Change Proposal within 30 calendar days, then the Change Proposal is deemed denied, thereby commencing the time for appeal under these General Conditions.

(iii) Binding Decision: PWC's decision will be final and binding unless Contractor appeals the decision.

Section 8.08 Execution of Change Orders

(a) PWC and Contractor shall execute appropriate Change Orders covering:

(i) changes in the Contract Price or Contract Times that are agreed to by the parties, including any undisputed sum or amount of time for Work performed in accordance with a Work Change Directive;

(ii) changes in Contract Price resulting from a PWC set-off, unless Contractor has duly contested such set-off;

(iii) changes in the Work which are: (a) ordered by PWC, (b) required because of PWC's acceptance of defective Work or PWC's correction of defective Work, or (c) agreed to by the parties, subject to the need for Design Engineer's recommendation if the change in the Work involves the design (as set forth in the Contract Documents), or other engineering or technical matters; and

(iv) changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results.

(b) If PWC or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Section, it shall be deemed to be of full force and effect as if fully executed.

Section 8.09 Notification to Surety

(a) If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

Article IX. Tests, Inspections, and Approvals; Correction, Removal, or Acceptance of Defective Work

Section 9.01 Access to Work

(a) PWC, Design Engineer, their consultants and other representatives and personnel of PWC, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

Section 9.02 Tests, Inspections, and Approvals

(a) Contractor shall give Project Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

(b) PWC shall retain and pay for the initial services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by PWC, except those costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 10.05.

(c) If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish the required certificates of inspection or approval to PWC.

(d) Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

(i) by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to PWC;
(ii) to attain PWC's and Design Engineer's acceptance of materials or equipment to be incorporated in the Work;
(iii) by manufacturers of equipment furnished under the Contract Documents;
(iv) for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
(v) for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to PWC, as confirmed in writing by Project Engineer to Contractor.

(e) If the Contract Documents require the Work (or part thereof) to be approved by PWC or its designee, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

(f) If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Project Engineer, Contractor shall, if requested by Project Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given PWC timely notice of Contractor's intention to cover the same and PWC had not acted with reasonable promptness in response to such notice.

Section 9.03 Defective Work

(a) It is Contractor's obligation to assure that the Work is not defective.

(b) PWC or its designee has the authority to determine whether Work is defective, and to reject defective Work.

(c) Prompt notice of all defective Work of which PWC has actual knowledge will be given to Contractor.

(d) Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if PWC has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

(e) When correcting defective Work, Contractor shall take no action that would void or otherwise impair PWC's special warranty and guarantee, if any, on said Work.

(f) In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against PWC by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if PWC and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then PWC may impose a reasonable set-off against payments due.

Section 9.04 Acceptance of Defective Work

(a) If, instead of requiring correction or removal and replacement of defective Work, PWC prefers to accept it, PWC may do so (subject, if such acceptance occurs prior to final payment, to Design Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles and will not endanger public safety).

(b) Contractor shall pay all claims, costs, losses, and damages attributable to PWC's evaluation of and determination to accept such defective Work (such costs to be approved by PWC as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order.

(c) If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then PWC may impose a reasonable set-off against payments due. If the acceptance of defective Work occurs after final payment, Contractor

shall pay an appropriate amount to PWC.

Section 9.05 Uncovering Work

(a) PWC has discretion to require, at its initial cost, additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

(b) If any Work is covered contrary to the written request of PWC, then Contractor shall, if requested by PWC or its designee, uncover such Work for observation, and then replace the covering, all at Contractor's expense.

(c) If PWC considers it necessary or advisable that covered Work be observed by PWC or inspected or tested by others, then Contractor, at PWC's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as PWC may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

(i) If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility PWC shall be entitled to impose a reasonable set-off against payments due.

(ii) If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 calendar days of the determination that the Work is not defective.

Section 9.06 PWC May Stop the Work

(a) If the Work is defective, or Contractor fails to supply sufficiently skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then PWC may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of PWC to stop the Work shall not give rise to any duty on the part of PWC to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

Section 9.07 PWC May Correct Defective Work

(a) If Contractor fails within the time specified by PWC in a written notice from PWC to correct defective Work, or to remove and replace rejected Work as required by PWC, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then PWC may, after seven (7) calendar days written notice to Contractor, correct or remedy any such deficiency.

(b) In exercising the rights and remedies under this Section, PWC shall proceed expeditiously. In connection with such corrective or remedial action, PWC may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at

the Site or for which PWC has paid Contractor but which are stored elsewhere. Contractor shall allow PWC and its officers, employees, representatives, agents and other contractors, and Design Engineer and its employees and agents access to the Site to enable PWC to exercise the rights and remedies under this Section.

(c) All claims, costs, losses, and damages incurred or sustained by PWC in exercising the rights and remedies under this Section will be charged against Contractor as set-offs against payments due. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

(d) Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by PWC of PWC's rights and remedies under this Section.

Article X. Claims

Section 10.01 Claims Process

(a) The following disputes between PWC and Contractor shall be submitted to the Claims process set forth in this Article:

(i) Appeals by PWC or Contractor of Design Engineer's decisions regarding Change Proposals;
(ii) PWC or Contractor's demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
(iii) Disputes that Design Engineer has been unable to address because they do not involve the design (as set forth in the Contract Documents), the acceptability of the Work, or other engineering or technical matters.

Section 10.02 Submittal of Claim

(a) The party submitting a claim shall deliver it directly to the other party to the Agreement promptly (but in no event later than 30 calendar days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 calendar days of the decision under appeal. The responsibility to substantiate a claim shall rest with the party making the claim. In the case of a claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

Section 10.03 Review and Resolution

(a) The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party.

Section 10.04 Dispute Resolution

(a) In the event of any dispute, controversy, or claim of any kindor nature arising under or in connection with this Agreement (a "Dispute") and involving any two or more of the following parties, PWC, Design Engineer, Contractor or any subcontractor of Contractor, the party initiating the Dispute shall serve written notice of a Dispute on the party(ies) to the dispute, and those parties shall endeavor to settle the dispute first through direct, informal discussions between the parties' selected representatives. Any such representative(s) shall have binding authority to settle the Dispute. In the event the parties do not settle the Dispute within ten (10) calendar days from the date of written notice of the Dispute, any party to the Dispute may, by written notice to the other party(ies), engage a mediator certified under the laws of the State of North Carolina to mediate the Dispute within thirty (30) calendar days of such notice. The parties to the Dispute shall attend mediation in good faith. In the event mediation is unsuccessful, any party to the dispute may initiate arbitration proceedings. Any controversy or claim arising out of or relating to the Contract Documents, or the breach thereof, shall be settled by binding arbitration administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. All of the foregoing dispute resolution procedures shall be held in Cumberland County, North Carolina. The costs of the mediator and arbitrator in a dispute resolution process shall be divided equally among the parties to the process; provided, however, PWC shall bear at least one-third of the cost if PWC is a party to the dispute resolution and the remainder of the cost shall be divided equally among the other parties participating in the dispute resolution. PWC shall, in its contractual arrangements with Design Engineer, and Contractor shall, in its contracts with Subcontractors and they in their contracts with lower-tier subcontractors authorize and direct such parties to participate in the dispute resolution procedures set forth in this Section. Unless otherwise directed in writing by PWC, Contractor shall continue the Project and maintain compliance with the scheduling deadlines set forth in theContract Documents during any dispute resolution proceedings. If Contractor continues to perform, PWC shall make payments due for the continued performance in accordance with this Agreement. The provisions of this Section shall not extend any applicable statutes of limitation or repose.

Article XI. Payments to Contractor; Set-Offs; Completion; Correction Period

Section 11.01 Progress Payments

(a) The Schedule of Values will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Project Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period. Progress payments for cost-based Work will be based on the Cost of the Work completed by the Contractor during the pay period.

(b) Applications for Payments:

(i) Contractor shall submit to Project Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or another

location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that PWC has received the materials and equipment free and clear, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect PWC's interest.

(ii) Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

(iii) The amount of retainage for progress payments will be as stipulated in the Contract Documents.

(c) Review of Applications:

(i) Project Engineer will, within ten (10) Business Days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to PWC, or return the Application to Contractor indicating in writing Project Engineer's reason(s) for refusing to recommend payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application.

(ii) Project Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Project Engineer to PWC, based on Project Engineer's observations of the executed Work, and on Project Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Project Engineer's knowledge, information, and belief:

1) the Work has progressed to the point indicated;
2) the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work, and any other qualifications stated in the recommendation); and
3) the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Project Engineer's responsibility to observe the Work.

(iii) By recommending any such payment Project Engineer will not thereby be deemed to have represented that:

1) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Project Engineer in the Contract Documents; or
2) there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by PWC or entitle PWC to withhold payment to Contractor.

(iv) Neither Project Engineer's review of Contractor's Work for the purposes of recommending payments nor Project Engineer's recommendation of any payment, including final payment, will impose responsibility on Project Engineer:

1) to supervise, direct, or control the Work, or
2) for the means, methods, techniques, sequences, or procedures of construction, or the

safety precautions and programs incident thereto, or

3) for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
4) to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price.

(v) Project Engineer may refuse to recommend the whole or any part of any payment if, in Project Engineer's opinion, it would be incorrect to make the representations to PWC outlined in this Section.

(d) Project Engineer will recommend reductions in payment (set-offs) necessary in Project Engineer's opinion to protect PWC from loss because:

(i) the Work is defective, requiring correction or replacement;
(ii) the Contract Price has been reduced by Change Orders;
(iii) PWC has been required to correct defective Work or has accepted defective Work in accordance with these General Conditions;
(iv) PWC has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
(v) Project Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

(e) Payment Becomes Due:

(i) Twenty (20) Business Days after presentation of the Application for Payment to PWC with Project Engineer's recommendation, the amount recommended (subject to any PWC set offs) will become due, and when due will be paid by PWC to Contractor.

(f) Reductions in Payment by PWC:

(i) In addition to any reductions in payment (set-offs) recommended by Project Engineer, PWC is entitled to impose a set-off against payment based on any of the following:

1) PWC has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
2) Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
3) Contractor has failed to provide and maintain required bonds or insurance;
4) PWC has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
5) PWC has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
6) the Work is defective, requiring correction or replacement;
7) PWC has been required to correct defective Work or has accepted defective Work in accordance with the Contract Documents;
8) the Contract Price has been reduced by Change Orders;
9) an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

10) liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or Completion of the Project; or
11) there are other items entitling PWC to a set off against the amount recommended.

(ii) If PWC imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Project Engineer, PWC will give Contractor immediate written notice stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. PWC shall promptly pay Contractor the amount so withheld, or any adjustment agreed to by PWC and Contractor if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

(iii) Upon a subsequent determination that PWC's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due and subject to interest as provided in the Contract Documents.

Section 11.02 Substantial Completion

(a) When Contractor considers the entire Work ready for its intended use Contractor shall notify PWC and Design Engineer in writing that the entire Work is substantially complete and request that PWC acknowledge in writing that Contractor has met Substantial Completion.

(b) Promptly after Contractor's notification, PWC, Contractor, and Design Engineer shall make an inspection of the Work to determine the status of completion. If PWC does not consider the Work substantially complete, PWC will notify Contractor in writing giving the reasons therefor. PWC shall thereafter submit to Contractor an initial draft of punch list items to be completed or corrected before final payment.

(c) If Design Engineer considers the Work substantially complete, Design Engineer will deliver to PWC a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Design Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. PWC shall have seven (7) Business Days after receipt of the preliminary certificate to make written objection to Design Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, PWC concludes that the Work is not substantially complete, PWC will, within fourteen (14) calendar days after submission of the preliminary certificate to PWC, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor.

(d) At the time of receipt of the preliminary certificate of Substantial Completion, PWC and Contractor will confer regarding PWC's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by PWC. Unless PWC and Contractor agree otherwise in writing, PWC shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon PWC use or occupancy of the Work.

(e) After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment and shall complete such items

within the time specified by PWC. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

(f) PWC shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

Section 11.03 Partial Use or Occupancy

(a) Prior to Substantial Completion of all the Work, PWC may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which PWC, Design Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by PWC for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

(i) At any time PWC may request in writing that Contractor permit PWC to use or occupy any such part of the Work that PWC believes to be substantially complete.
(ii) At any time Contractor may notify PWC and Design Engineer in writing that Contractor considers any such part of the Work substantially complete and request Design Engineer to issue a certificate of Substantial Completion for that part of the Work.
(iii) Within a reasonable time after either such request, PWC, Contractor, and Design Engineer shall make an inspection of that part of the Work to determine its status of completion. If Design Engineer does not consider that part of the Work to be substantially complete, Design Engineer will notify PWC and Contractor in writing giving the reasons therefor.
(iv) No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements regarding builder's risk or other property insurance.

Section 11.04 Final Inspection

(a) Upon written notice from Contractor that Completion of the Project has been achieved or an agreed portion thereof is complete, PWC will promptly make a final inspection with Project Engineer, Design Engineer, and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

Section 11.05 Final Payment

(a) Application for Payment:

(i) After Contractor has, in the opinion of PWC, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents, and other documents, Contractor may make application for final payment.
(ii) The final Application for Payment shall be accompanied (except as previously delivered) by:

1) all documentation called for in the Contract Documents;

2) consent of the surety, if any, to final payment;
3) satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to PWC free and clear or will so pass upon final payment;
4) a list of all disputes that Contractor believes are unsettled; anD
5) complete and legally effective releases or waivers (satisfactory to PWC) required by the Contract Documents.

(iii) If Design Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Design Engineer will, within ten (10) Business Days after receipt of the final Application for Payment, indicate in writing Design Engineer's recommendation of final payment and present the Application for Payment to PWC for payment. Such recommendation shall account for any set-offs against payment that are necessary in Design Engineer's opinion to protect PWC from loss for the reasons stated above with respect to progress payments. At the same time Design Engineer will also give written notice to PWC and Contractor that the Work is acceptable and that Completion of the Project has been achieved. Otherwise, Design Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

(iv) Within thirty (30) calendar days after the presentation to PWC of the final Application for Payment and accompanying documentation, the amount recommended by Design Engineer (less any further sum PWC is entitled to set off against Design Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by PWC to Contractor.

Section 11.06 Waiver of Claims

(a) The making of final payment will not constitute a waiver by PWC of claims or rights against Contractor. PWC expressly reserves claims and rights arising from defective Work appearing after final inspection, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from Contractor's indemnification obligations, or from Contractor's continuing obligations under the Contract Documents.

(b) The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against PWC other than those pending matters that have been duly submitted or appealed under the provisions of the Contract Documents.

Section 11.07 Correction Period

(a) If within one (1) year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to PWC and in accordance with PWC's written instructions:

(i) correct the defective repairs to the Site or such other adjacent areas;

(ii) correct such defective Work;
(iii) if the defective Work has been rejected by PWC, remove it from the Project and replace it with Work that is not defective, and
(iv) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

(b) If Contractor does not promptly comply with the terms of PWC's written instructions, or in an emergency where delay would cause serious risk of loss or damage, PWC may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

(c) In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date only as provided in the Contract Documents.

(d) Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Article XII, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

(e) Contractor's obligations under this Article XII are in addition to all other obligations and warranties. The provisions of this Article XII shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

Article XII. Suspension of Work and Termination

Section 12.01 PWC May Suspend Work

(a) At any time and without cause, PWC may suspend the Work or any portion thereof for a period of not more than 90 consecutive calendar days by written notice to Contractor and Design Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than thirty (30) calendar days after the date fixed for resumption of Work.

Section 12.02 PWC May Terminate for Cause

(a) The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

(i) Contractor's continued failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
(ii) Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
(iii) Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

(iv) Contractor's repeated disregard of the authority of PWC, Project Engineer, or Design Engineer.

(b) If one or more of the events identified in Paragraph 13.02(a) occurs, then after giving Contractor (and any surety) ten (10) calendar days written notice that PWC is considering a declaration that Contractor is in default and termination of the Agreement, PWC may proceed to:

(i) declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
(ii) enforce the rights available to PWC under any applicable performance bond.

(c) Subject to the terms and operation of any applicable performance bond, if PWC has terminated the Contract for cause, PWC may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which PWC has paid Contractor but which are stored elsewhere, and complete the Work as PWC may deem expedient.

(d) PWC may not proceed with termination of the Contract under Paragraph 13.02(b) if Contractor within seven (7) calendar days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure and such efforts are agreed to by PWC.

(e) If PWC proceeds as provided in Paragraph 13.02(b), Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by PWC, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to PWC. Such claims, costs, losses, and damages incurred by PWC will be reviewed by PWC as to their reasonableness and, when so approved by PWC, incorporated in a Change Order.

(f) Where Contractor's services have been so terminated by PWC, the termination will not affect any rights or remedies of PWC against Contractor then existing or which may thereafter accrue, or any rights or remedies of PWC against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by PWC will not release Contractor from liability.

(g) The provisions of any applicable payment or performance bond shall govern over any inconsistent provisions of this Section.

Section 12.03 PWC May Terminate For Convenience

(a) Upon seven (7) calendar days written notice to Contractor, PWC may, without cause and without prejudice to any other right or remedy of PWC, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

(i) completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
(ii) expenses sustained prior to the effective date of termination in performing services and

furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

(iii) other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

(b) Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

Section 12.04 Contractor May Stop Work or Terminate

(a) If, through no act or fault of Contractor, (1) the Work is suspended for more than ninety (90) consecutive calendar days by PWC or under an order of court or other public authority or (2) PWC fails for sixty (60) calendar days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven (7) calendar days written notice to PWC, and provided PWC does not remedy such suspension or failure within that time, terminate the Contract and recover from PWC payment on the same terms as provided in this Article.

(b) In lieu of terminating the Contract and without prejudice to any other right or remedy, if PWC has failed for thirty (30) calendar days to pay Contractor any sum finally determined to be due, Contractor may, seven (7) calendar days after written notice to PWC, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

Section 12.05 Morality

(a) If, in the sole opinion of PWC, at any time Contractor or any of its owner(s) or employee(s) or agent(s) (each party, owner, employee, and agent is an "Actor") engages in any one or more actions that bring disrepute, contempt, scandal, or public ridicule to the Actor or subject the Actor to prosecution or offend the community or public morals or decency or denigrate individuals or groups in the community served by PWC or are scandalous or inconsistent with community standards or good citizenship or may adversely affect PWC's finances, public standing, image, or reputation or are embarrassing or offensive to PWC or may reflect unfavorably on PWC or are derogatory or offensive to one or more employee(s) or customer(s) of PWC, PWC may immediately upon written notice to Contractor terminate the Agreement, in addition to any other rights and remedies that PWC may have pursuant to the Contract Documents or at law or in equity.

Article XIII. Miscellaneous

Section 13.01 Additional General Terms and Conditions

(a) Contractor shall be subject to any additional terms and conditions for this Project as set forth in the applicable Appendices as specific in the Agreement, which is incorporated by reference as if set forth word-for-word herein.

Section 13.02 Giving Notice

(a) Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

(i) delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended;
(ii) delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice; or
(iii) sent to PWC or Contractor's designee(s) via email, with a confirmation of receipt.

Section 13.03 Computation of Times

(a) When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

Section 13.04 Cumulative Remedies

(a) The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

Section 13.05 Limitation of Damages

(a) With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither PWC nor Design Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

Section 13.06 No Waiver

(a) A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or any other provision of the Contract Documents.

Section 13.07 Survival of Obligations

(a) All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement or termination of the services of Contractor.

Section 13.08 Controlling Law

(a) The Agreement shall be governed by the law of the State of North Carolina.

Section 13.09 Headings

(a) Article and paragraph headings, numbers, and letters are inserted for convenience only and do not constitute parts of these General Conditions.

PERFORMANCE BOND

Date of Execution: _____

Name of Principal: _____

(Contractor)

Name of Surety: _____

Name of Contracting

Body: Fayetteville Public Works Commission, Fayetteville, N.C.

Amount of Bond: _____

PROJECT: BIG ROCKFISH CREEK OUTFALL CONTRACT II

KNOW ALL MEN BY THESE PRESENTS, That We, the Principal and Surety above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these present.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal entered into a certain Contract with the Contracting Body, identified as shown above and hereto attached.

NOW, THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions there of that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any Guaranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under the several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:	CONTRACTOR:
(Proprietorship of Partnership)	(Trade or Corporate Name)
By:	By:
Title:	Title:
(Corporate Secretary or Assistant Secretary, Only)	(Owner, Partner, Corporate President or Vice-President, Only) **(CORPORATE SEAL)**
Witness:	SURETY COMPANY:
	(Surety Company Name)
	By:
Countersigned:	Title:
(N.C. Licensed Resident Agent)	(Attorney in Fact) **(SURETY CORPORATE SEAL)**

PAYMENT BOND

Date of Execution: _____

Name of Principal: _____

(Contractor)

Name of Surety: _____

Name of Contracting

Body: Fayetteville Public Works Commission, Fayetteville, N.C.

Amount of Bond: _____

PROJECT: **BIG ROCKFISH CREEK OUTFALL CONTRACT II**

KNOW ALL MEN BY THESE PRESENTS, that We, the PRINCIPAL and Surety above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal entered into a certain Contract with the Contracting Body, identified as shown above and hereto attached.

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under the several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed, and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:	CONTRACTOR:
_____	_____
(Proprietorship of Partnership)	(Trade or Corporate Name)
By:	By:
_____	_____
Title:	Title:
_____	_____
(Corporate Secretary or Assistant Secretary, Only)	(Owner, Partner, Corporate President or Vice-President, Only) **(CORPORATE SEAL)**

Witness:	SURETY COMPANY:
_____	_____
	(Surety Company Name)
	By:
Countersigned:	_____
	Title:
_____	_____
(N.C. Licensed Resident Agent)	(Attorney in Fact) **(SURETY CORPORATE SEAL)**

POWER OF ATTORNEY
(ATTACH)

CERTIFICATE(S) OF INSURANCE
(Attach)

NOTICE TO PROCEED

TO: _____ Date: _____

PROJECT: **BIG ROCKFISH CREEK OUTFALL CONTRACT II**

You are hereby notified to commence work in accordance with the Contract dated _____, 2023, on or before _____, 2023, and you are to complete the WORK within the **contract period** thereafter. The date of final completion therefore is _____.

FAYETTEVILLE PUBLIC WORKS COMMISSION

BY: _____

Candice S. Kirtz

Director of Supply Chain

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged this the _____ day of _____, 2023.

(CONTRACTOR)

BY: _____

TITLE: _____

- END OF SECTION –

SECTION C - ADMINISTRATIVE PROVISIONS

DIVISION 1
GENERAL REQUIREMENTS

01000 – SPECIAL CONDITIONS

GENERAL

These Special Conditions are intended to supplement and amplify the Technical Specifications and other requirements of this Contract. Where any article or item of the Contract Documents is modified or deleted by this document, the remaining unaltered provisions of that article, paragraph, subparagraph, or clause shall remain in effect. In the event of a conflict, these Special Conditions shall take precedence.

1. Summary

BRCO Contract 2 includes construction of approximately 11,180 linear feet (LF) of 24-inch gravity sewer and 3,595 LF of 18-inch gravity sewer along Big Rockfish Creek (Upchurch Lake) and Stewarts Creek, extending from Sta. 116+88 to Sta. 264+63 (MH 107 included) of the BRCO alignment. This outfall extends under Camden Road, and routes between multiple houses and includes approximately 630 LF of guaranteed trenchless installation. This contract also includes an additive bid alternate consisting of demolition of the existing Camden Glen Lift Station (LS) and connection to the main outfall with approximately 850 LF of 8-inch gravity sewer, which includes approximately 410 LF of guaranteed trenchless installation under the controlled access of I-295.

This project also requires stream crossings, stream bank stabilization, trenchless construction, bypass pumping, post-inspection of the completed gravity sewer, and all other items necessary to provide a complete project.

All work shall be done in accordance with PWC technical standards, specifications, and standard contract terms.

A complete set of BRCO Contract 2 design drawings includes the following sheets:

- General Sheets
  - G1 through G4
- Utility Plan Sheets
  - UP-G
  - UP-3B
  - UP-4
  - UP-5A
  - UP-9A
- Civil Design Sheets
  - C-10B
  - C-11 through C-22
  - C-23A
  - C-36A
- Demolition Sheets
  - CD-4 and CD-5
- Traffic Control Details

  - TC-0 through TC-3
- Detail Sheets
  - D-1 through D-10
- Construction Access Sheets
  - A-2 and A-8

2. Customer Service

The Contractor is expected to make every effort to reduce the impact of their operation to PWC's operation and maintenance of the water and sewer system, and the affected residents within the project area. Full cooperation and coordination with PWC personnel and residents is expected. It is expected that the Contractor will promptly respond to any concerns voiced by residents and/or PWC personnel, and make every effort to resolve them immediately. Providing exemplary customer service shall be incidental to this Contract, and no additional payment will be made for this service. Property owner concerns and requirements are documented in Paragraph 22 herein this specification.

The Contractor at all times shall conduct the work in such a manner as to ensure the least obstruction to traffic as practicable. The convenience of the general public and of the residents and businesses along and adjacent to the Work shall be provided for in a satisfactory manner, consistent with the operation and local conditions. The Contractor shall construct and maintain any necessary ramps, boardwalks, or other means to maintain pedestrian traffic. Costs for such work shall be incidental to the unit prices bid. The Contractor shall at all times cooperate with the public and merchants as affected by the construction operations and shall endeavor to maintain good public relations at all times.

The Contractor shall make every effort to minimize the impacts of their operation on the residents. The Contractor shall schedule and stage construction in a sequence to minimize disruption to the largest number of residents for the shortest period of time. Special considerations shall be given to the neighborhood solid waste and trash collection schedule, mail delivery, and bus routes.

The Contractor shall schedule their operations to minimize the likelihood of equipment operating throughout the night and/or on weekends in residential areas. The Contractor shall remove their equipment from the yards of residents at the end of each work day. Equipment shall not be left in yards during weekends, unless the Contractor has specific written permission from the property owner. The Contractor shall fully coordinate their operations and schedule with the Fayetteville Public Works Commission.

3. Customer Notification

Whenever the customer's water service or sanitary sewer service must be interrupted by the Work, the Contractor shall notify the customer a minimum of 48 hours in advance of the interruption. This notification shall be accomplished with door hanger notification cards placed at the addresses of the affected customers. Customers shall be informed when service interruption takes place and the expected duration. This notice shall be a minimum 48 hours prior to service interruption. The Contractor shall make every effort to minimize inconvenience to the public and customers.

Service interruptions to customers shall be limited to no more than eight (8) hours at any given time. The notifications shall clearly describe the work to be undertaken and approximate dates of the work. All notifications shall be clear and legible. The text of the notifications shall be approved by the PWC in advance of the beginning the Work. The Contractor shall coordinate the notification

and service interruption with the PWC, prior to issuing notices. All coordination and notification shall be in accordance with PWC requirements.

4. Order of Precedence

Except as may be otherwise specifically stated in the Contract Documents, the following order of precedence shall be adhered to for resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents:

1. Any addendum issued prior to the opening of Bids
2. Section 01000 – Special Conditions
3. Section 01025 – Measurement and Payment
4. Approved Contract Drawings
5. PWC Standard Details
6. PWC Technical Specifications
7. General Conditions of the Contract Documents

5. Guarantee

All work completed under these Contract Documents shall be guaranteed by the Contractor for a period of one (1) year from the date of final acceptance. During that period, all serious defects discovered in the work, as determined by the Fayetteville Public Works Commission, shall be removed and replaced in a satisfactory manner by the Contractor at no cost to the Fayetteville Public Works Commission. The Fayetteville Public Works Commission may conduct an independent inspection, at their sole expense, of the completed work prior to the completion of the one (1) year guarantee period.

Should the Fayetteville Public Works Commission's inspection determine that the work is not in accordance with these Contract Documents; the Contractor shall mobilize and make all necessary repairs at no expense to the Fayetteville Public Works Commission. The Contractor will receive written notification from the Fayetteville Public Works Commission, and be allowed the chance to review any available inspection pictures or other documentation. The Contractor shall respond to the Fayetteville Public Works Commission with a plan of action within 30 calendar days of receiving notification. The Contractor shall mobilize and begin to complete the work within 60 calendar days of receiving notification. The Contractor shall:

- Repair such defective land or areas.
- Correct such defective Work, or if the defective Work has been rejected by the PWC Project Engineer, remove it from the project and replace it with Work that is not defective.
- Satisfactorily correct, repair, remove, or replace any damage to other Work, damage to the work of others, and damage to other land or areas.

If the Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the Fayetteville Public Works Commission reserves the right to contract with another party to complete the warranty work, at the sole expense of the Contractor. All claims, costs, losses, and damages (including but not limited to all fees and charges or design professionals, attorneys, and other professionals and all court, arbitration or other dispute resolution costs arising out of or relating to such correction or repair or such removal and replacement of work of others) shall be paid by the Contractor.

The warranty period stated is specifically for the work installed by the Contractor. Any collateral damage discovered during the warranty period will be investigated and the Contractor will be required to respond if the damage is determined to have occurred during the construction process.

6. Discovery of Defects

The Contractor warrants and guarantees to the Fayetteville Public Works Commission, that all work will be in accordance with these Contract Documents, will not be defective, and that all materials and equipment used for the work are appropriate for the Project. The Fayetteville Public Works Commission shall provide prompt notice of all defects to Contractor upon discovery. All defective work, whether or not in place, may be rejected, corrected, or accepted, at the Fayetteville Public Works Commission's sole discretion.

The Fayetteville Public Works Commission reserves the right, should an error be discovered in the estimate or conclusive proof of defective work or materials used by or on the part of the Contractor be discovered either before or after the final payment has been made, to claim and remove by process of law such sum or sums as may be sufficient to correct the error or make good the defects in the work and materials.

7. Cleanliness During Construction

The Contractor shall perform a daily clean-up of all dirt, debris, scrap materials and other disposable items resulting from the Contractor's operations, whether on-site or off-site. The Contractor shall remove all construction equipment, barricades, tools, surplus materials, etc. no longer required at the site. No open accumulation of refuse, surplus or scrap materials will be permitted. Failure of the Contractor to maintain a clean site will be basis for the Fayetteville Public Works Commission to issue a written notice of non-compliance with the Contract. Should that notice to correct not be complied with within twenty-four (24) hours, the Fayetteville Public Works Commission may authorize the cleanup to be performed by others and the costs shall be deducted from monies due the Contractor. The Contractor shall legally dispose off-site all waste materials and other excess materials resulting from construction. No separate payment shall be made for maintaining a clean project site.

The Contractor shall control the dust in all areas of the project limits for the entire duration of construction. Dust control may be accomplished by use of either water or dust control materials, or as directed by the PWC Project Engineer. No separate payment shall be made for dust control.

8. Construction Staking

McKim & Creed shall provide all construction staking. The Contractor shall contact Jason Savage PE, at (919) 233-8091 to schedule construction staking. A minimum of ten (10) business days notice is required. Cut sheets will be provided. It is expected that the Contractor will have a copy of the cut sheets on the job site, and available for inspection by PWC staff.

The Contractor shall not install any utilities without a cut sheet. Utilities shall be installed at the locations and elevations indicated on the cut sheets unless otherwise approved by the Owner. Should a conflict arise between the Contract Drawings and the cut sheets, the cut sheets shall take precedence. Contractor shall make the Project Coordinator aware of any conflict between the Contract Drawings and the cut sheets as soon as it is discovered. The Contractor shall verify invert elevations of all sewer mains and manholes by instrument.

Where designated on the Contract Drawings or as outlined herein, Contract shall coordinate with McKim & Creed within 10 days after execution of notice of award to confirm ground elevation and final casting heights of manholes prior to ordering these manholes.

1. **All manholes within traffic areas.**
2. **All manholes near or within wetland and floodplain areas.**
3. **All manholes within obscured areas (highly vegetated and wooded areas)**

9. Site Restoration

Once construction is completed, the Contractor shall be responsible for restoring the site to as good as, or better than, existing conditions. All exposed areas are to be sodded with appropriate vegetation to insure against erosion, in accordance with the Soil Erosion and Sedimentation Control requirements.

For those areas outside the project limits, the Contractor shall be responsible for installing sod in all disturbed areas, unless otherwise noted on the plans, and for the full replacement of any driveways disturbed as part of their operations.

Surplus pipe, material, tools, and temporary structures shall be removed by the Contractor. All dirt, rubbish, and other debris from the operation shall be removed and legally disposed of by the Contractor, at no additional cost to the Fayetteville Public Works Commission.

10. Working Times

For work within NCDOT Right-of-Way:

The Contractor shall comply with requirements provided by the relevant encroachment permits obtained for this project. NCDOT will permit working hours between 8:00 a.m.to 5:00 p.m. (Monday for Friday) for work contained in the Lakeview Drive, Lake Farm Road, and Mariners Landing Drive.

For all other work:

The Contractor shall be permitted to work to Monday through Friday, during normal business hours and additional hours as needed if permission is obtained from the Fayetteville Public Works Commission. Regular working times shall not exceed 50 hours per week, 10 hours per day (between 7:00 a.m. and 5:00 p.m.), Monday through Friday. No Work, unless otherwise required due to an emergency or as authorized by the Fayetteville Public Works Commission, shall be performed after these times, on weekends, or on Holidays observed by the Fayetteville Public Works Commission without prior written approval from the Fayetteville Public Works Commission. Requests to work other than regular working times or legal Holidays must be submitted in writing to the Fayetteville Public Works Commission a minimum of two (2) business days in advance of the requested time. Requests shall only be approved if the Fayetteville Public Works Commission determines that the work is necessary in order to meet the contract completion date. The written request shall include a proposed schedule for the Work to be completed.

Legal holidays observed by the Fayetteville Public Works Commission include New Year's Day, Martin Luther King's Birthday, Good Friday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving (2 days), and Christmas (2 days).

For any authorized work beyond the regular working times, Inspector Overtime shall be charged at a rate of $80.00 per hour. Should the contractor fail to obtain the required approval to work beyond the regular working times, Inspector Overtime will be charged at the rate of $250.00 per 30-minute interval. The Fayetteville Public Works Commission's Project Coordinator shall be present at all times when the Contractor is approved to work beyond regular working times. The overtime charge will be deducted from the Contractor's pay application. Inspector overtime may be waived for circumstances beyond the Contractor's control, as deemed by the PWC Project Engineer or PWC Project Coordinator.

Should, during the course of construction, it become necessary to complete portions of the Work outside of the regular working times. The Contractor, The Fayetteville Public Works Commission, and any other applicable party will determine an acceptable schedule and any special parameters required for the Work. Payment for this work will be made at the contract price and no additional payment will be considered.

Should the Contractor be granted permission to work outside of the normal working times, Inspector Overtime will be charged as outlined above. Should the contractor fail to leave the site at the agreed upon time, Inspector Overtime will be charged at the unapproved rate as outlined above. The Contractor shall adhere to the time restrictions agreed to in the Project Engineer's approval of the request. The Contractor will be assessed a penalty of $250 per 30-minute interval for any portion thereof, should the Contractor fail to leave the site at the agreed upon time. Inspector overtime will be charged during the approved hours, as outlined above. The penalty may be waived for circumstances beyond the Contractor's control, as deemed by the PWC Project Engineer or PWC Project Coordinator.

Should the Contractor fail to request approval or notify the owner and work outside of the normal working times, the Contractor will be assessed a penalty of $250 per 30-minute interval for the total amount of time worked.

If the Contractor fails to properly complete activities within the times indicated or otherwise approved (7:00 a.m. and 5:00 p.m. or hours designated by the approved encroachment), PWC will issue a Non-Compliance Notice.

11. Subcontractors

The jack and boring sub-contractor shall complete the jack and boring operation utilizing its own equipment and labor forces. The jack and boring subcontractor superintendent shall be an employee of the jack and boring subcontractor.

Second tier subcontractors shall not be allowed. Violation of this provision of the Contract may be deemed a breach of the Contract.

12. Stored Materials

The option to incorporate stored materials shall be addressed prior to the first pay estimate. The Contractor will not be permitted to request payment for stored materials on future pay applications once the first application has been signed by the Contractor and submitted to the Owner. If considered for payment, stored materials shall be delivered and stored to the satisfaction of the Project Coordinator. Stored material estimates must be submitted in a form acceptable to the Project Engineer. All invoices shall accompany the pay estimates and be separated by the associated project "Part" (i.e. Part A, Part B, etc.). Stored materials shall be paid for according to eighty-five percent (85%) of the actual invoice value including sales tax.

13. Materials

All materials to be utilized are to be in new condition. Materials are to be stored in strict accordance with the manufacturer's directions. Materials are to be of the type and brand specified within these Contract Documents. **No alternative or substitute materials shall be considered prior to award of the Contract.**

The Contractor shall submit all requests to utilize materials other than specified to the Fayetteville Public Works Commission for review. The Contractor shall be responsible for providing all required documentation necessary for the Fayetteville Public Works Commission to review and decide if the substitute material meets the required specification. All information shall be submitted in accordance with Section 01300 – Submittals.

The Contractor will be responsible for providing documented proof that the proposed substitution has a proven record of performance when used in the intended application as confirmed by actual field test(s) or by successful installations. The Fayetteville Public Works Commission reserves the right to reject any such proposed changes or substitutions at their sole discretion, and is under no obligation to justify their decision.

14. Equipment

The Contractor shall be equipped with equipment perfectly adaptable for the type of construction required; excavation and pipe handling machines shall be of sufficient capacity to handle the work in an expeditious and safe manner. The Fayetteville Public Works Commission reserves the right to deny the use of inadequate equipment or of equipment not capable of performing the work in an acceptable manner.

With respect to the foregoing, it is the intent of the PWC to require that the Contractor be equipped to perform the work shown and specified, expeditiously and in accordance with the best modern practice.

15. Warranty Against License Agreements

The Contractor shall warrant to the Fayetteville Public Works Commission that the equipment used on this Contract, where covered by patents or license agreements, is furnished in accordance with such agreements and that the prices included herein cover all applicable royalties and fees in accordance with such license agreements. The Contractor shall defend, indemnify, and hold the Fayetteville Public Works Commission harmless from and against any and all costs, loss, damage, or expense arising out of or in any way connected with any claim of infringement of patent, trademark, or violation of license agreement.

16. Spill Response

The Contractor shall not discharge or pump any sewage, solids, or debris on the ground, streets, storm water system, ditches, or streams. Any accidental sewage spills shall be immediately reported to the PWC Water Resources Construction Department, (910) 223-4716. After normal business hours, the Contractor shall contact the PWC Dispatch Center, (910) 678-7400 or (910) 223-4494.

In the event that raw sewage is spilled, discharged, leaked or otherwise deposited in the open environment, due to the Contractor's work, the Contractor is responsible for any cleanup of solids and disinfection of the area affected. This work will be performed at the Contractor's expense with no additional cost to the Fayetteville Public Works Commission. The Contractor is also responsible for complying with any and all regulatory requirements with regard to the size of the spill with no additional cost to the Fayetteville Public Works Commission. The Contractor shall cooperate fully with the Fayetteville Public Works Commission and the applicable State agencies in responding to and cleaning up the spill. Any work completed by the Fayetteville Public Works Commission in responding to a spill caused by the Contractor's operations shall be billed to the Contractor.

Where sewage has backed up into a property due any aspect of the Contractor's operation, the Contractor shall immediately notify the Fayetteville Public Works Commission, inspect the property with the Fayetteville Public Works Commission and agree on remedial measures. The Contractor shall be responsible for all cleaning, repair and / or replacement of damaged property, temporary relocation of all occupants of the affected properties, if required, all to the satisfaction of the property owner. These actions shall be undertaken immediately upon learning of the backup. Cleaning shall be performed by firms specializing in this type of work. All costs associated with the cleaning, repair, replacement of damages, occupant accommodations, insurance and spill remediation shall be borne by the Contractor. All remediation measures required as part of a spill response are part of acceptance of the project, and final payment shall not be made until such time all required measures are addressed and approved by the appropriate regulatory agency.

17. Submittals

The Contractor shall provide submittal information as outlined in Section 01300 – Submittals, and as outlined below.

The Contractor shall not perform any portion of the Work requiring submittal and review until the respective submittal has been approved by the Fayetteville Public Works Commission. Work performed prior to review and acceptance shall be at the Contractor's risk.

The Contractor shall submit the following information to the Fayetteville Public Works Commission prior to commencing the work.

The Contractor shall submit to the Fayetteville Public Works Commission three (3) paper copies and one (1) electronic (in Adobe format) copy of all required submittal data for review and approval. The Contractor shall furnish, prior to use of the materials, satisfactory written certification of his compliance with the manufacturer's standards for all materials, conformance with the methods of the manufacturer, and accordance with all standards specified and referenced within these specifications.

If requested by the PWC, the manufacturer of materials, equipment, or product shall submit evidence of having consistently produced materials of satisfactory quality and performance for a period of at least two (2) years. The Contractor shall provide submittals on the following:

- A sample door hanger, notifying the residents of the project and those times that the resident may not have water or sewer service
- Contractor's safety plan, including confined space program
- Proposed project schedule
- Contractor personnel emergency contact information
- Labor and equipment rates
- Sample property owner agreement (if applicable)
- Executed property owner agreement (if applicable)
- Traffic control plan
- Demolition and abandonment plans
- Temporary bypass plans
- Active shoring design, if required
- Pre-construction video and pictures
- Erosion and sediment control materials
- Ductile iron pipe materials and fittings
- Restrained joint ductile iron pipe for boring and directional drilling
- Restrained joint ductile iron pipe and fittings
- Polyvinyl chloride (PVC) pipe materials and fittings
- Chemical grout for sealing wet well
- Pre-cast manholes
- Manhole ring and cover
- Manhole Epoxy Coal Tar Lining
- Specialty manhole corrosion resistance and waterproof coatings
- Fencing materials (posts, fabric, hardware)
- Insurance as required by approved encroachments
- Submittals for steel or other encasement pipe
- Submittals for stream bank armoring materials such as high performance turf reinforcement mat, geotextile fabric, rip rap, and vegetation plantings
- Anti-Microbial Admixture
- Ceramic epoxy coating

The Contractor shall provide submittals on all materials and shall furnish the manufacturers' certifications that all of the materials are in compliance with the specifications, codes, and standards referenced in these Contract Documents. The submittals shall include installation instructions and details of all component materials and construction methods.

All information contained within the submittals shall be in accordance with these Contract Documents. Facsimile (fax) copies of the submittals or re-submittals will not be acceptable.

The Fayetteville Public Works Commission shall review and approve, disapprove, or approve with comment the submittal within 10 business days of receipt. All notifications on the submittals will

be provided to the Contractor in writing. The Fayetteville Public Works Commission shall return one (1) paper copy and one (1) electronic copy (in Adobe pdf format) of the submittals to the Contractor.

The Fayetteville Public Works Commission's review of the submittals will cover only general conformity to these Contract Documents, external connections, and dimensions which affect the layout. The Fayetteville Public Works Commission's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. The Fayetteville Public Works Commission's review shall not relieve the Contractor of the Contractor's sole responsibility for errors, omissions, or deviations in the drawings and data, nor of the Contractor's sole responsibility for compliance with these Contract Documents.

Any need for more than one (1) re-submission, or any other delay in obtaining the Fayetteville Public Works Commission's review of submittals, will not entitle the Contractor to an extension of the contract duration, unless the delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of the Fayetteville Public Works Commission to review any submittal within the submittal review period specified herein and to return the submittal to the Contractor.

18. Limits of Construction

The Contractor shall confine their construction operations to the existing permanent easement or the existing street rights-of-way. The Contractor may use additional area for staging, storage, or other operations, provided that written permission is obtained from the property owner and all disturbed areas are restored to conditions equal or better than existing.

19. Construction Access and Access Limitations

Construction access shall be in accordance with the Construction Drawings specifically A-2 and A-8 and the following requirements:

A. Contractor shall utilize an in and out approach to access the corridor between SSMH 45 and Lakeview Drive.

B. Contractor shall utilize the easternmost connector for Lakeview Drive to Waldo's Beach Road as the dedicated haul route as designated on Sheet A-8 to access the sewer installation between SSMH and Lakeview Drive, and along Lakeview Drive to SSMH 58.

C. Contractor shall utilize the easternmost connector for Lakeview Drive to Waldo's Beach Road or Waldo's Beach to the sewer easement to access the sewer installation between SSMH 58 and SSMH 61.

D. Contractor shall utilize Waldo's Beach Road to access the sewer installation between SSMH 61 and SSMH 65. A combination of the Waldo's Beach Road and the designated haul route from Camden Road to Mill Creek Road to Lake Farm Road to access the sewer installation between SSMH 65 and SSMH 73.

E. No construction traffic is permitted access across the permanent sewer easement on Parcel #33 on Sheet C-18. Access to the receiving pit shall be through the dedicated

haul route on Mill Creek Road to Lake Farm Road. Access to the jacking/launching pit shall be through Mariners Landing Drive as designated on Sheet A-8.

F. Contractor shall utilize designated access/haul route on Northbank Street from Camden Road to Mariners Landing Drive to access sewer installation from SSMH 75 to SSMH 91. Mariners Landing Drive is a looped residential street. Contractor is not permitted to utilize the eastern portion of this looped street for any construction access. This portion of the street shall only be utilized to redirect local traffic as designated on traffic control Sheet TC-2.

G. No construction traffic is permitted across the permanent sewer easement on Parcel #33 and Parcel #34 on Sheet C-18. Access to the receiving pit shall be through the dedicated haul route on Mill Creek Road to Lake Farm Road. Access to the jacking/launching pit shall be through Mariners Landing Drive as designated on Sheet A-7.

H. No construction traffic is permitted across the permanent sewer easement on Parcel #35 and #36 on Sheet C-20. Access to the receiving pit shall be through the dedicated haul on Northbank Street to Mariners Landing Drive. Access to the jacking/launching pit shall through the Camden Road construction access as designated in Sheet A-2 and as shown on Sheet C-20. Foot traffic to permit hand clearing as defined in Paragraph 21 on Parcel #35 using an in and out approach from Mariners Landing Drive herein is permitted.

I. Contractor shall access launching pit for the trenchless installation between SSMH 91 and SSMH 92, launching pit for the trenchless installation between SSMH107 and SSMH 163 (Peartree Estates/Camden Glenn Lift Station elimination outfall) and sewer installation from SSMH 92 to SSMH 107 using an in and out approach via the Camden Road construction access. No construction access is permitted to this corridor using any portions of I-295. No disturbance is permitted within any portions of the I-295 right of way.

J. Contractor shall utilize the designated haul/access route as shown on Sheet A-8 entailing Pine Cone Lane, Redspire Lane, and Ritson Lane to the Camden Glen Road construction access to access the receiving pit for the trenchless installation between SSMH 107 and SSMH 163 and the sewer installation from SSMH 163 to SSMH 165. This designated haul/access route shall be bonded as identified in Paragraph 22 herein.

K. NCDOT Right-of-Way

The Contractor shall not begin work within any NCDOT rights-of-way until the Owner has obtained the necessary encroachment(s). Copies of the approved encroachments are contained within these Contract Documents. The Contractor shall conform to all requirements of the approved NCDOT encroachment permit. Prior to any construction within NCDOT rights-of-way, the Contractor shall notify the District Engineer's Office in accordance with the approved encroachment. A copy of the approved encroachment agreement/permit shall be kept on the job site at all times and made readily available if requested. The NCDOT reserves the right to stop any work for noncompliance without claim for extra compensation.

20. Agreements with Property Owners

Any and all agreements between the Contractor and individual property owners for work, services, rent of staging areas, etc. located outside of any easements or public rights-of way shall not obligate the City of Fayetteville or the Fayetteville Public Works Commission in any manner. Prior to performing any work on private property, which could remotely infer the Contractor acting on behalf of PWC, the Contractor shall furnish to the Fayetteville Public Works Commission a signed and witnessed statement executed by the Property Owner acknowledging that the City of Fayetteville and the Fayetteville Public Works Commission are not liable for any agreements between the Property Owner and the Contractor, and that the Contractor shall hold harmless and defend the City of Fayetteville and PWC from all claims, damages, etc. Additionally, the Contractor shall have the responsibility to secure any and all agreements with property owners for any actions taken by their Subcontractors.

Prior to release of final payment, the Contractor shall obtain written releases from the property owners for satisfaction, completion, and restoration. Copies of those written releases shall be submitted to Fayetteville Public Works Commission with the final pay application.

The Contractor bears complete responsibility for any damage to private properties outside of the existing easements and/or rights-of-way.

21. Special Property Owner Considerations

The following special property owner considerations are to be followed as described below (No separate payment shall be made for any of these provisions unless explicitly defined on the construction drawings and as defined in the Bid Form):

Parcel 23, 6748 Waldos Beach Road

The Contractor shall erect safety fencing along the limits of the construction corridor through this property and provide signage and temporary detour routes to redirect tenants and patrons of the RV park safely around the work area.

The Contractor shall maintain access to Waldo's Beach Campground and Swim Park during normal business hours, which are considered to be 10:00 am to 5:30 pm Sunday through Saturday. The Contractor shall maintain no less than two (2) points of access to the existing pool house at all times during construction. Contractor shall coordinate with PWC Project Coordinator a minimum of 14 calendar days so property owner can temporarily relocate parking disturbed by construction.

The Contractor shall coordinate with PWC Project Coordinator and property owner a minimum of14 calendar days to initiate the location of the private water main from the existing well that serves the RV park. The Contractor shall be responsible for locating the water main prior initiating the sewer construction in accordance with Paragraph 32 herein and protect the existing utility in accordance with Paragraph 31.

The Contractor shall coordinate with PWC Project Coordinator and property owner a minimum of14 calendar days to initiate the location of the private water, sewer, telephone, cable and electrical services in the vicinity of the sewer main alignment from approximate Station 176+50 to Station 179+75 that serve the RV bays. The Contractor shall be responsible for locating these services prior to initiating the sewer construction in accordance with Paragraph 32 herein and protect the existing utility in accordance with Paragraph 31. The Contractor shall also be responsible for providing temporary services to maintain drainage, water, sewer, telephone/cable/internet and electrical hookups and permanently replacing all drainage, water, sewer, telephone/cable/internet and

electrical services, risers, equipment racks, etc. that conflict with the sewer installation. All temporary and permanent utility facilities shall be in accordance with all local and state building and inspection codes and requirements.

Parcel 28, 7075 Lamplighter Drive

If damage to the septic system and drain field occurs as a result of the project construction, Contractor shall repair the system as necessary to original condition or better. If damage cannot be repaired, then Contractor shall be responsible for the property's septic pump and haul operations until the Contractor can connect the property to the outfall.

Parcel 33, 7341 Mariners Landing Drive

This property shall not be utilized for construction access between Lake Farm Road and Mariners Landing Drive. Ingress and regress is only permitted for installation of the boring/launching pit as shown on Sheet C-18. No equipment or any kind shall be permitted elsewhere on this property, and no material of any kind shall be permitted elsewhere on this property. The driveway shall not be disturbed during construction.

Parcel 34, 7345 Mariners Landing Drive

This property shall not be utilized for ingress/egress/regress. No equipment or any kind shall be permitted on this property, and no material of any kind shall be permitted on this property. The driveway shall not be disturbed during construction.

If damage to the existing septic system components occur as a result of project construction, the Contractor shall repair the system as necessary to original condition or better. If damage cannot be repaired, then Contractor shall be responsible for the property's septic pump and haul operations until the Contractor can connect the property to the outfall.

If any damage to the existing irrigation system components occur as a result of project construction, the Contractor shall repair the system as necessary to original condition or better.

Parcel 35, 7105 Mariners Landing Drive

The existing fence on this property shall not be disturbed or damaged as a result of project construction. No access will be permitted through the fenced portion of this property. No access shall be permitted in the back yard.

Removal of the existing River Birch tree and Bradford Pear tree (See Tree Schedule, Item 6 and 9 on Sheet C-20), located within the permanent easement area, shall be done by hand, and the stumps ground utilizing equipment that will not damage existing septic system components. If damage to septic system and drain field occurs as a result of the project construction, Contractor shall repair the system as necessary to original condition or better. If damage cannot be repaired, then Contractor shall be responsible for the property's septic pump and haul operations until the Contractor can connect the property to the outfall.

There shall be no ingress, egress, or regress across this parcel except as may be necessary for the removal of the trees and any landscaping items designated as needing to be removed by PWC.

No material storage on this property will be allowed.

If damage to the irrigation system or landscape lighting on this property occurs as a result of project construction, the Contractor shall repair the component(s) or system(s) as necessary to original condition or better.

Parcel 36, 7115 Mariners Landing Drive

Contractor shall erect a temporary, six (6) foot high chain link fence adjacent to the temporary construction easement on the eastern side of the permanent utility easement to keep pets and small children out of the work area. Temporary gate shall be provided to permit construction entrance and alleviate any unauthorized use of temporary construction entrance.

Access to the rear yard for tree removal shall be made from the Camden Road side of the project easement area. The gazebo located on this property shall not be disturbed. The neighbors' fence, located on the common property line, with arched top panels, shall not be disturbed.

If damage to septic system and drain field occurs as a result of the construction, Contractor shall repair the system as necessary to original condition or better. If damage cannot be repaired, then Contractor shall be responsible for the property's septic pump and haul operations until the Contractor can connect the property to the outfall.

There will be no material storage on this property.

22. Road Restoration and Indemnity Bonds

The Contractor shall document conditions of NCDOT and non-NCDOT residential roads prior to construction and shall restore roads within the project area as well as residential access roads to equal or better condition. Lakeview Drive, Lake Farm Road and Mariners Landing shall be completely rebuilt per the street reconstruction detail contained in the Drawings. Street reconstruction shall consist of 8-inches of compacted ABC stone and a surface course of S9.5B inclusive of rolled asphalt curbing. Testing will be required in accordance with the current Standards and Specifications for Roads and Structures or as directed by the District Engineer. If required by District Engineer and if existing condition and asphalt thickness is suitable, full width milling and overlay for a minimum length of twenty-five (25') shall be performed at all tie-back locations. No separate payment shall be made except for portions shown explicitly on drawings and or as indicated in the Bid Form.

Per specifications, the Contractor is required to obtain an indemnity bond as specified by NCDOT encroachments.

Prior to starting construction, the Contractor is required to post a Performance and Indemnity Bonds to NCDOT in accordance with the following amounts:

A. Encroachment Agreement on SR 3399 Lakeview Drive (E062-026-20-00167)-$2,421,835.00

B. Encroachment Agreement on SR 3473 Lake Farm Drive (E062-026-20-00168)-$543,075.00

C. Encroachment Agreement on SR 4164 Mariners Landing Drive (E062-026-20-00169) - $2,436,395.00

Prior to starting construction, the Contractor is required to post a Performance and Indemnity Bond with the Town of Hope Mills in the amount of $579,000, based on the opinion of probable construction cost (OPCC) that was developed by the engineer for the cost of replacing Hope Mills roadway infrastructure related to the designated haul route to access the Peartree Estates Lift Station

elimination outfall (See Sheet A-8 entailing the streets of Pine Cone Lane, Redspire Lane, and Ritson Lane). Proof of payment of the required Performance and Indemnity Bond is to be submitted to PWC with the initial payment request.

The Contractor bears complete responsibility for any damage to private properties outside of the existing easements and/or rights-of-way.

23. Disposal of Debris

The Contractor shall properly dispose of all debris resulting from their operations, in accordance with applicable Federal, State, and local laws, regulations, and rules.

The Contractor shall take all necessary precautions to prevent debris and other items related to their construction efforts from entering the sewer system.

24. Staging Areas

The Contractor may elect to secure staging areas for storing materials, equipment, etc. All costs, such as rent, restoration, erosion control measures, and permit fees shall be the responsibility of the Contractor. The location and operation of the staging yard shall comply with all applicable Federal, State, and local regulations.

The Contractor is responsible for complying with all applicable local, State, and Federal regulations related to the operation of staging yards. The Contractor shall obtain all applicable permits from the City of Fayetteville, Hope Mills, or Cumberland County, including staging area shown on Sheet C-20. All staging areas will be subject to inspection by the PWC, or agent thereof, for compliance with this section without prior notice. Any deficiencies will be documented by PWC and written notice will be provided to the Contractor. The Contractor must rectify deficiencies within 30 calendar days of receipt of the notice. Failure to do so will result in breach of contract.

Proper measures, to include total secondary containment, shall be used for fuel storage and to prevent spillage. The Contractor shall not stockpile materials or place fill dirt on any lot without approval from the property owner. Should the Contractor's stockpiles create drainage problems, the Contractor shall construct drainage improvements at his expense as directed by the PWC Project Engineer and/or PWC Project Coordinator or relocate the stockpile(s). The Contractor shall obtain a signed agreement for the staging area in accordance with the General Conditions of these Contract Documents. Upon the completion of the project the Contractor shall obtain a signed release from the property owner for the satisfactory completion and restoration prior to issuance of final payment. The Contractor shall obtain a signed agreement for the staging area in accordance with the General Conditions of these Contract Documents. Upon the completion of the project the Contractor shall obtain a signed release from the property owner for the satisfactory completion and restoration prior to issuance of final payment. The Contractor shall take all necessary measures to establish permanent ground cover on the staging area, prior to obtaining a signed release from the property owner. Restoration of the staging area and establishment of permanent ground cover shall be in accordance with the approved erosion control plan. All erosion control measures shall remain in place until the permanent ground cover is established. Restoration of the staging area shall be at the Contractor's sole expense, and shall not constitute additional compensation.

The costs for such Work shall be considered incidental to the Project and no additional payment will be made.

25. Fire Department Coordination

Existing fire hydrants shall be accessible to the Fire Department at all times. If the fire hydrants are in need of replacement, relocation, or connected to a new water main, the Fayetteville Public Works Commission, PWC Project Coordinator, and the appropriate Fire Department shall be notified and coordinated with prior to commencing work. Fire hydrants shall not be removed from service without prior approval of the Fayetteville Public Works Commission.

26. Public Safety

The Contractor shall barricade all work, roads, etc. to keep the public away from the construction. The Contractor shall provide protection to all portions of the Work when the work is not in progress, provide and install measures, and all other materials necessary to protect the public. Any damage through the lack of proper protection or from any other cause, shall be the Contractor's sole responsibility.

In the event it is necessary to leave the insertion pit, or any other excavation, open during non-work hours, the Contractor shall take all necessary precautions to protect the public from damage or injury. The Contractor shall notify the Fayetteville Public Works Commission of any excavations that will remain open during non-work hours (i.e., overnight). In no case shall the excavations be left open during a weekend or any time longer than one (1) night.

Steel plates can be utilized, in accordance with the requirements of Specification Section 02500 – Traffic Control.

The Contractor and subcontractors shall be responsible for any damage to any City of Fayetteville property, PWC property, private property, or property owned by other utilities, and shall make good such damages. The Contractor and subcontractors shall be responsible for and pay for any claims against the Fayetteville Public Works Commission.

27. Emergency Response

The Contractor shall maintain a construction crew capable of performing emergency maintenance work 24 hours a day, seven (7) days a week, including all holidays. The Contractor shall furnish phone numbers for at least three (3) individuals in responsible charge (capable of making company binding decisions) to be available 24 hours a day, seven (7) days a week, including holidays. The emergency phone numbers and responsible individual's names shall be furnished to the Fayetteville Public Works Commission at the pre-construction conference. The Contractor's designated emergency personnel shall be expected to respond and perform emergency maintenance work immediately, in less than two (2) hours, or the work will be performed by others and all associated costs shall be deducted from the Contractor's payment.

Once on-site, the Contractor shall notify the PWC Dispatcher (910-678-7400) of the problem, the anticipated response time, and the estimated time required to complete the repair work. It is the Contractor's responsibility to maintain the appropriate repair materials on-site in order to provide an immediate response to the emergency.

28. Jobsite Requirements

In addition to requirements outlined in these Contract Documents, the following are mandatory requirements that will be strictly enforced:

- Posted speed limits shall be strictly adhered to. No speeding.

- Driveways shall not be blocked without prior notification and coordination with the resident.
- Traffic conditions shall be maintained at all times, in accordance with the Contractor's approved traffic control plan.
- Excess soil, stone, equipment, materials, etc. in the road or along the right-of-way shall be removed at the end of each work day. Soil, stone, millings, pipe, etc., shall not be stored or stockpiled in the road right-of-way.
- All trenches, excavations, or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.
- Mailboxes and traffic signs shall be only removed as necessary to facilitate the installation of the Work and shall be reinstalled during the same day of removal. Any damages to mail boxes, signs or posts shall be repaired by the Contractor at no cost to the Fayetteville Public Works Commission.
- A sufficient number of portable toilets shall be provided for workers. These facilities shall be placed discretely out of public view, kept clean, and orderly.
- Contractor(s) shall not enter onto private property for the purpose of using water or electricity without the written permission of the property owner.
- The use of profane or abusive language or obscene gesturing by workmen will not be tolerated and will be just cause for immediate dismissal from the project site as directed by the Fayetteville Public Works Commission or its authorized representative.
- OSHA safety measures are to be maintained at all times. OSHA standard secure fencing shall be provided to prevent the intrusion of residents or animals into potentially hazardous areas.
- An English-speaking Contractor's representative is required for each separate work crew.
- Do not litter at any time.
- Promptly respond to all complaints.
- Wear proper protective clothing (hard hats, shoes, shirts, etc). Personnel must wear an approved safety vest at all times while working on the Fayetteville Public Works Commission's project.
- During the actual installation of the utilities, the excavated material may be temporarily stockpiled adjacent to the work area. In no case shall stockpiled material be allowed to remain for a period of time exceeding the work day.
- The trench shall be completely backfilled at the end of each work day, unless otherwise approved by the Fayetteville Public Woks Commission.
- If construction is temporarily halted during the work day, the open trench shall be manned continuously.
- Damage to sod and/or grass along the street right-of-way due to (but not limited to) temporarily stockpiled material, construction travel and other construction related activities shall be replaced with sod at the Contractor's sole expense.

29. Erosion and Sediment Control

The provisions of Chapter 139, North Carolina Statues as amended, Soil Erosion and Sedimentation Control shall be applicable to this project. The minimum requirements for erosion and sediment control are shown on the drawings, based on the anticipated construction methods. The Contractor shall adjust the measures to complement their operations and prevent the transmittal of silt. All necessary erosion control measures shall remain serviceable until the site is restored and stabilized. Upon such time, the Contractor shall remove all temporary measures.

All fees, penalties, fines for non-compliance and all civil actions resulting there from shall be the Contractor's responsibility and shall in no way involve the Fayetteville Public Works Commission. The Contractor shall immediately notify the Fayetteville Public Works Commission of any fine, penalty, or notice of non-compliance by NC Depart of Environmental Quality. The Contractor may be required to modify or supplement the measures at no additional cost to the Fayetteville Public Works Commission.

In addition to installing and maintaining the appropriate erosion control devices, the Contractor shall maintain a neat and clean jobsite. The Contractor shall take the necessary measures to minimize dust, ensure the streets are clean and free of debris, and other measures as required. The Contractor shall maintain the proper erosion control devices to ensure against erosion. The Contractor shall ensure that the catch basin and inlet protection devices are free of dirt and debris.

Permanent and temporary erosion control measures proposed by the Contractor for staging areas, haul roads, etc. shall be at the Contractor's expense and shall not constitute additional compensation.

30. Construction around Utility Poles and Guy Wires

The Contractor will be required to perform construction work around utility poles and guy wires which may be left in place within the construction limits of the project. The Contractor shall contact the owner of the utility to coordinate securing the poles during construction. It may be necessary for the Contractor to hire an electrical utility contractor to secure poles. All work outlined in this paragraph shall be at no additional cost to the Fayetteville Public Works Commission unless otherwise indicated on Drawings.

As indicated on Sheet C15, Contractor shall coordinate with PWC Project Coordinator and Lumbee River Electric Membership Corporation (LREMC) a minimum of three calendar days from Notice to Proceed to schedule designated pole and guy wire relocation. LREMC will relocate pole and guy wire. Contractor and PWC Project Coordinator to assist LREMC in establishing a relocation that will be outside are of work and present no conflicts during construction and maintenance of sewer easement. Fayetteville Public Works Commission will pay for any relocation charges by LREMC for the pole and guy wire relocation, if LREMC charges for said work.

31. Protection of Existing Utilities

The Contractor shall take every precaution to guard against any or all damage to existing structures, pipe lines, and/or equipment of the utility owner. Any damage to existing structures and/or pipe lines shall be the direct responsibility of the Contractor. Damage shall be replaced and/or repaired by the Contractor as directed by the utility owner, or the value of such deducted from any monies due the Contractor under this Contract.

The utility owner shall supervise the Contractor's operation of all valves, gates, and other equipment. Except in case of emergency, the Contractor shall notify the utility owner a minimum of two (2) business days in advance of the need for operation of valves, gates, and other equipment necessary to allow the work to progress.

The Contractor shall in no case permit the introduction of wastewater from the existing system into any new sanitary sewer without prior approval of the utility owner. The Contractor shall notify the utility owner in advance of commencing the connection to an existing sanitary sewer in order that a utility representative may be present to observe the work.

The Contractor shall notify the utility owner and the PWC Project Coordinator a minimum of 48 hours in advance to coordinate any proposed service interruption. Note: the scheduling and coordination of a water outage within the PWC system shall be done in accordance with Paragraph 64 of these Special Conditions. If an unscheduled service interruption occurs, the Contractor shall immediately notify the utility owner and the PWC Project Coordinator. The Contractor shall immediately commence repairs in accordance with the utility owner's standards.

During the course of construction, some work will need to be performed during non-normal working hours to accommodate the utility owner's operations, traffic, and/or public convenience. The Contractor, PWC Project Engineer and utility owner will determine an acceptable schedule required for work during such hours. The cost of this work shall be included in the base bid.

32. Existing Utilities

The Contractor shall locate existing underground utilities in the areas of work. If utilities are to remain in place, the Contractor shall provide protection during construction operations. Additionally, the Contractor will coordinate with utility companies when working in close proximity to their line/services.

Should uncharted or incorrectly charted piping or other utilities be encountered during excavations, the Contractor shall immediately consult the PWC Project Engineer for directions as how to proceed. The Contractor shall fully cooperate with the PWC and the utility companies in keeping respective services and facilities in operation.

The Contractor shall adhere to the provisions and revisions of the 2014 Underground Utility Safety and Damage Prevention Act, North Carolina General Statutes. The Contractor shall contact the NC One Call System for locates prior to beginning work in a particular area. The Contractor shall include the cost of any coordination and cooperation for utilities in his bid.

Actual horizontal and vertical locations have not been verified. As part of the Contract work, the Contractor is required to excavate each utility which may conflict with construction in advance to verify locations. The utilities shall be excavated a minimum of fourteen (14) working days in advance of actual installation of new utilities to allow the PWC Project Engineer an opportunity to adjust grades, alignments, etc., to avoid a conflict. Separate payment will not be made to physically verify the utility locations.

If the Contractor fails to schedule locates or perform advance physical locations in advance of the construction and a conflict arises, the Contractor will be required to make corrective measures as instructed by the PWC Project Engineer at the Contractor's expense. The Contractor's failure to advance plan (minimum fourteen (14) working days) by physically uncovering existing utilities in advance of construction shall not be cause for claim of lost time or for additional compensation. No additional payment will be made for re-mobilization required by the utility locator.

When the Contractor's controlling operations are halted due to the failure of a utility owner to relocate or adjust a utility after being properly notified by the Contractor, the contract period may be extended by the amount of time the Contractor's controlling operations have been delayed while awaiting the relocation or adjustment. Contractor shall proceed with work in areas not affected by the relocation or adjustment delay.

The Fayetteville Public Works Commission and PWC Project Engineer shall not be liable to the Contractor for any claims, costs, losses, or damages incurred or sustained on or in connection with locating existing underground installations.

33. Crossing Existing or Proposed Utilities

The Contractor shall conduct their operations so that the following requirements are adhered to:

a. Underground telephone, cable TV, and gas utilities or conduit banks shall be crossed maintaining a minimum of 12-inch separation or clearance.
b. Electrical crossings shall be performed while the conductor is de-energized and at all times in the presence of the utility owner. Electrical crossings shall be in accordance with NESC Requirements. Electrical primary conductor crossings shall be as follows:
    - Crossing over a conductor, maintain a minimum of 12 inches of undisturbed soil encasing the conductor.
    - Crossing under a conductor shall be accomplished by boring, maintaining 12 inches of undisturbed soil encasing the conductor.

No separate payment shall be made for this work.

34. Preconstruction Video

The Contractor shall complete a pre-construction video inspection of the project area, to document pre-existing conditions. The video shall be in a standard digital video file format (i.e. mp4, mpg, or avi) and supplied on standard portable digital media (i.e. USB Flash Drive or USB Hard Disk Drive) as approved by the PWC. The intent of this video is to document the existing project conditions: easement areas, the driveways, the condition of the curb and gutter, if any; the condition of the road, the condition of the mailboxes, retaining walls, structures, landscaping, any other resident installed improvements; and the condition of the sod. The Contractor shall also include any easement areas, especially those passing through yards, driveways, etc. The video must identify the house number and the street name in the audio track and visually. The Contractor may also include any pre-existing conditions they want brought to the attention of the Fayetteville Public Works Commission by including notes and time position on the index sheet. The Contractor can also include still pictures of the areas, for additional documentation. The video and any other accompanying data shall be submitted to the Fayetteville Public Works Commission prior to starting work. The pre-construction video will be utilized by the PWC in the resolution of complaints. Therefore, it is in the Contractor's best interest to ensure that the pre-construction video is comprehensive and covers all areas to be impacted by the Work.

35. Monthly Progress Meetings

The Contractor and PWC Project Engineer shall mutually establish a regular time to meet virtually on a monthly basis until at such time PWC's COVID19 policies allow for in person meetings to occur or resume. Virtual meetings will be facilitated by PWC through web conference and/or via web base with the Microsoft application Teams. **It is strongly encouraged that the Contractor have access to Teams.** If in person monthly progress meetings are allowed to occur or resume, the meetings shall be held at the Fayetteville Public Works Commission complex at 955 Old Wilmington Road, or at the project site, and will generally last about an hour. The Contractor's superintendent or designated representative shall attend these meetings. The Contractor's representative shall be knowledgeable of the project, issues that need to be addressed, and be able to make binding decisions for the Contractor.

The purpose of the meeting is to discuss various project related items, including, but not limited to: safety concerns, overall project status and schedule, traffic control, the Contractor's schedule for the upcoming month, issues that the Contractor and/or PWC need to address, and any proposed or potential change orders.

The cost for the Contractor's representative to attend the monthly meetings shall be included in the work.

36. Permits and Approvals

Unless otherwise provided in these Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. PWC shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all charges and inspection fees necessary to complete the Project which are applicable at the time of the opening of Bids, or, if there are no bids, on the Effective Date of the Contract. PWC shall pay all charges of utility owners for connections to provide permanent service to the Project.

This project is required to have multiple permits and approvals issued. The approved permits and approvals are included in the Appendices to these Contract Documents. The Contractor shall have a set of the approved, permitted plans on the jobsite at all times. The Contractor shall make the approved, permitted plans available for inspection by PWC staff.

The necessary permits and approvals, which are included in the Appendices, are listed below:

A. NCDEQ LQS ES&C

B. NCDOT Encroachment agreements

C. NCDEQ-DWR 401

D. USACE 404

E. Sewer Extension Permit as approved by DEQ

F. NCDOT Temporary and Permanent Driveway Permit(s) and Performance Indemnity Bond for each driveway

G. NCDEQ-DWI Authority to Bid and Construct

H. NCDEQ Findings of No Significant Impact (FONSI)

37. Bulk Water Usage

The Fayetteville Public Works Commission will allow the Contractor to use water from its existing water system. The Contractor shall utilize proper backflow prevention devices when obtaining water from the Fayetteville Public Works Commission's system. The Contractor shall contact PWC's Environmental System Protection Department at 910-223-4699 to determine the required backflow prevention devices, and to obtain a bulk water use permit. The Contractor shall be responsible for the cost of the bulk water permit fee. The bulk water permit fee is an annual fee and shall be paid by the Contractor each year that this Contract is in effect. The Contractor shall provide documentation on the amount of water used for their operations and provide a monthly statement to the Fayetteville Public Works Commission.

38. Street Excavation/Degradation Permits

Excavation/Degradation permits will be required by the City of Fayetteville. The Contractor shall complete the Excavation permit application and provide it to PWC for submittal to the City. PWC will be responsible for any fees due the City for the Excavation permit. The Contractor shall adhere

to all City requirements regarding street restoration, including those as set forth in the Permanent Pavement Patch detail that is included in these Contract Drawings.

39. Temporary and Permanent Driveway Permits

NCDOT temporary driveway permits must be renewed every 90 days once obtained per the NCDOT. McKim & Creed shall be responsible for obtaining the initial temporary driveway permits and application fees. The Contractor shall be responsible for obtaining and renewing temporary driveway permits and application fees ($50 per driveway) during construction including Waldos Beach Road and Camden Road.

Performance and indemnity bonds will be required and provided by Contractor to obtain approval of driveway permits and ensure the proper removal of the access and restoration of the highway right-of-way. Performance and Indemnity Bonds in the amount of $10,000 for each temporary and permanent driveway will be provided by Contractor in the form of a Corporate Surety Bond, Continuing Indemnity Bond, certified or cashier's check, or Irrevocable Letter of Credit. Where Surety Bonds are furnished, an authorized agent of the Surety Company who must be a resident of North Carolina must sign them and a Power of Attorney authorizing him/her to sign must be attached to the bond.

The Division Engineer or designated representative will retain Performance and Indemnity Bonds until such time as the Bonds are released. Certified or cashier's checks will be immediately forwarded to the Controller in Raleigh upon receipt and will not be retained by the Division Engineer.

The Division Engineer will release Performance and Indemnity Bonds one year following satisfactory completion of the work. Contractor shall be responsible for removal of temporary driveway and restoring right of way to original or better conditions, for notifying the bonding company after the one year and providing a copy of the Temporary and Permanent Driveway Permit to the bonding company. The bonding company must submit a request for release of the Bond with a copy of the Temporary and Permanent Driveway Permit to the Division Engineer.

All costs associated with coordination and bonding shall incidental to the temporary and permanent driveway installations, and no separate payment shall be made.

40. Traffic Control

The CONTRACTOR is solely responsible to traffic control. The Contractor shall coordinate activities so as to minimize disruption of traffic and inconvenience to residents and the general public. All traffic control measures shall be in accordance with the Town of Hope Mills, City of Fayetteville and NCDOT requirements, and the Contractor shall adhere to all requirements for the duration of the Project.

The Contractor shall submit the proposed traffic control plan to PWC, prior to commencing any Work. The plan shall indicate how traffic will be managed, signage to be used, and potential traffic patterns resulting from the plan implementation. PWC will forward the proposed plan to the appropriate agency for review and comment.

The Contractor shall notify the Town of Hope Mills and PWC a minimum of three (3) business days prior to implementing any lane closures and/or traffic control devices.

The Contractor shall be liable for any damages resulting from negligence or using inadequate work zone traffic control. PWC reserves the right to stop any work for non-compliance. Failure to provide and maintain adequate traffic control devices may result in PWC's refusal to make payment until corrective measures are in place.

Improper signage and traffic control devices will not be allowed. PWC reserves the right to relocate and/or remove such non-conforming signs and devices, setup proper signage to ensure public safety and deduct all costs for these items which may be incurred by the PWC. The Contractor shall make no claim for such work performed.

All traffic control shall be in accordance with the terms outlined in this paragraph, with PWC Specification Section 02500 – Traffic Control, with Town of Hope Mills requirements, and with the requirements of NCDOT encroachment agreements, as appropriate.

It may be necessary to close portions of Mariners Landing Drive, Lake Farm Road, and Lakeview Drive or side streets for short durations, in order to complete the work. The term "short duration" is generally considered to be no more than one (1) work week (five (5) business days). Road closures lasting more than one (1) work week can be considered, depending on the nature and location of the work. "Short duration" closures shall not impede access to any homes, driveways, solid collection waste pickup, package and postal deliveries, and emergency responses (fire, police, ambulance, etc.). To assist with this requirement, Contractor will be permitted to steel plate trenches so that road is traversable. Steel plating of these road shall conform to the current NCDOT Standards and Specifications for Roads and Structures and in accordance with Section 02500 (applicable subsection, NCDOT). Contractor shall submit a plating plan to NCDOT for review and approval.

All proposed road closures shall be coordinated with the Fayetteville Public Works Commission a minimum of 30 calendar days in advance. A proposed traffic control plan for these streets, consisting with the requirements shown on Sheets TC-0 to TC-3, shall be submitted with the request to close the road, along with the proposed duration.

Temporary road closures for the alternate bid contained in Mariners Landing Drive (trenchless crossing installations between SSMH 75 to SSMH 76 and between SSMH 90 and SSMH 91) will be allowed provided traffic control plan is submitted and approved by NCDOT. Contractor shall only have one temporary road closure occurring at any given time. Contractor shall not have temporary road closure occurring for alternate bid for SSMH 75 to SSMH 76 occurring at the same time as the alternate bid for SSMH 90 to SSMH 91. The work area shall be protected using approved road closure barricades in accordance with MUCTD and NCDOT requirements. The work area perimeter shall also be provided a temporary chain fence and a gate of suitable width to allow construction ingress and egress. Excavations within the work area must be adequately secured using steel plates that cover the entire excavation pit a minimum of 2 feet on all sides whenever work is not progressing. All work outside of the road closure shall conform to NCDOT encroachment provisions for maintaining access to any homes, driveways, solid collection waste pickup, package and postal deliveries, and emergency responses (fire, police, ambulance, etc.).

Should it be necessary to have a lane closure during the project, the Contractor shall submit that request, in writing (to include a proposed traffic control plan), to the Fayetteville Public Works Commission a minimum of seven (7) calendar days in advance. The plan shall include the duration of the lane closures and the timing of the proposed closures (i.e., 9:00 am to 4:00 pm).

The Contractor shall coordinate with Fayetteville Public Work's Project Coordinator and NCDOT prior to NCDOT's issuance of approval for road and/or lane closures. The Contractor shall maintain access to the homes and businesses along Mariners Landing Drive, Lake Farm Road, and Lakeview Drive at all times. Failure to do so will result in all work being stopped and access be made, prior to continuing work. The Contractor shall not be entitled to additional time or compensation should any delays arise as a result of their failure to properly maintain access.

41. Testing, General

The Contractor shall coordinate and fully cooperate with the PWC Project Coordinator when scheduling testing. The Contractor shall provide a minimum of two (2) business days' notice when scheduling testing with the PWC Project Coordinator. All testing shall be in accordance with PWC technical specifications.

All sewer mains, water mains, and water laterals shall be tested to the satisfaction of the Fayetteville Public Works Commission, prior to being placed into service.

The Contractor shall provide all equipment, materials, personnel, traffic control and all means necessary to perform all testing and inspection at no additional costs to the Fayetteville Public Works Commission. If the same line segment and/or manhole fails the required testing more than two (2) times, the Contractor shall be charged a fee of $100.00 per test, beginning with the third attempt, until a passing test achieved.

42. Active Shoring Responsibility

If active shoring is required, the Contractor shall be responsible for obtaining an active shoring design approved and stamped by a currently licensed Professional Engineer in the state of North Carolina. The active shoring design must be submitted to the Engineer (McKim & Creed, Inc.) at least twenty-five (25) days prior to installation of the design on site. No separate payment shall be made for active shoring as it should be incidental for the work requiring active shoring.

43. Cleanliness during Construction

The Contractor shall perform a daily clean-up of all dirt, debris, scrap materials and other items resulting from their operations. No open accumulation of refuse, surplus or scrap materials will be permitted. The Contractor shall legally dispose off-site all waste materials and other excess materials resulting from construction.

Failure of the Contractor to maintain a clean site, including streets, will be basis for the Owner to issue a written notice of non-compliance with the Contract. The Contractor shall comply with the notice within 24 hours or as directed. If the Contractor fails to comply, the Owner may authorize the cleanup to be performed by others and the costs shall be deducted from the Contractor's pay application.

44. Dust Control

The Contractor shall control the dust in all areas of the project, including staging yard and haul routes for the entire duration of the Contract. The Contractor shall have a water truck, sweeper and a roller on-site at all times with trained personnel to operate the equipment. Watering and/or sweeping the streets shall be required as conditions dictate, or as required by the Owner. The sweeping operation shall direct all materials towards the disturbed areas and not into residential yards. Should the Contractor fail to provide adequate dust control, the Owner reserves the right to

stop work and/or refuse to process the Contractor's pay applications until the Contractor installs adequate dust control measures. No separate payment will be made for the control of dust.

45. Maintenance Stone

The Contractor may utilize maintenance stone as authorized by the Project Coordinator. This stone shall consist of number 57 stone or similar aggregate. Aggregate Base Course (ABC) is not considered maintenance stone and shall not be paid for as such. This paragraph and the use of maintenance stone shall not supersede the Contract requirements of maintaining the project site.

Payment shall not be made for the installation of maintenance stone unless authorized by the Project Coordinator. To be considered for payment, the maintenance stone shall be a minimum depth of four (4) inches and a minimum length of fifty (50) feet. Number 57 stone placed at the Contractor's convenience shall not be paid for.

46. Testing Aerial Pipes, Pipes Near Private Wells, and Pipes Crossing Wetlands

In areas where the interceptor is aerial, is located within a distance of 100 feet from a private well, or is crossing a wetland or abuts a wetland as designated on the drawings, specialized hydrostatic testing shall be performed as described below prior to being placed into service.

Hydrostatic pressure testing requirements of gravity sewer lines will vary between manholes. The Contractor shall determine individual pressure testing requirements of the gravity sewer mains by the following method. The contractor shall take the difference in elevation (in feet) between the invert out of the downstream manhole and the rim elevation of the upstream manhole, divide the difference in elevation by (2.31-ft / 1-psi) multiply that number by a x1.5 safety factor to determine the required testing pressure (in psi). The individual line segment shall then be hydrostatically tested to this pressure. No allowable leakage is allowed over a two hour period. All tests shall be performed in the presence of the Owner and/or Engineer. The Contractor will furnish all personnel, facilities, and equipment necessary to conduct the testing.

Example:

(B-A) / 2.31 ft./psi x 1.5 safety factor = testing pressure

Where,

B = Rim of Upstream Manhole

A = Invert out of Downstream Manhole

The Contractor will also furnish all factory restrained joint to adequately restrain the pipe in place to counteract the resulting thrust forces. The Contractor shall restrain a minimum of 20 feet of the gravity sewer as measured from the outside face of each manhole of the tested segment. Method of restraint shall be through internal pipe restraint. No external devices such as bell harnesses and restraining glands shall be allowed. Alternatively, the Contractor shall adequately restrain the plugged pipe within the manholes, taking precautions to protect the pipe and manhole from shifting or being damaged during the test. Any damage shall be acceptably repaired or completely replaced with new material acceptably to PWC. No separate payment shall be made for the restraining of the pipe.

47. Compaction Requirements

Compaction, Subgrade and Asphalt Testing:

The Contractor's responsibility for quality control is defined in 01400-Quality Control. Testing service responsibilities are also defined in Section 01400-Quality Control.

The testing requirements listed below specifically pertain this to project. This procedure shall be used at all times, unless otherwise modified by Project Coordinator and/or Project Engineer.

Tests for density of compaction are made at the sole direction of the Project Engineer or the Project Coordinator. All deficiencies shall be corrected by the Contractor without additional cost to the Owner. The following outlines the requirements for compaction testing:

For compaction testing of backfill during sewer installation: Perform one (1) test series each for every section of sewer main less than 250 feet between manholes. Each test series consists of a total of two (2) tests, one (1) each completed at the 95% and 98% compaction zones. For sections of sewer main greater than 250 feet between manholes, two (2) test series shall be completed, for a total of four (4) tests. The required method of testing will be sand cone test.

If a compaction test fails, the Contractor, at his option and cost, can perform two (2) additional tests fifteen (15) feet on either side of the failing test. If those two tests pass, the Contractor is required to re-excavate and re-compact that section between the passing tests. If one (1) of the tests fails, the Contractor shall re-excavate and re-compact from the passing test to the next manhole. If both tests fail, the Project Coordinator has the sole option to require another compaction test deeper within the zone (i.e., 95% compaction). This additional test shall be done at the Owner's cost. Should this additional test fail, the Contractor shall re-excavate and recompact the entire zone from manhole to manhole. Should the Project Coordinator elect not to complete an additional compaction test at a deeper depth, the Contractor shall re-excavate and recompact the entire section at the test elevation, from manhole to manhole. Any section re-excavated and re-compacted shall be re-tested in accordance with these specifications. Each retest (bracket or otherwise) will be at no cost to the Owner. Contractor will only receive payment for mainline pipe if it has passed compaction testing requirements.

For compaction testing of backfill subgrade during sewer installation: Perform one (1) test every 250 feet or one (1) test per street, whichever is shorter. The required method of testing will be sand cone test.

For compaction testing of the ABC subgrade: Perform one (1) test every 1000 feet or one (1) test per street, whichever is shorter. The required method of testing will be sand cone test.

For compaction testing of the Asphalt Pavement: Perform one (1) test every 1000 feet or one (1) test per street, whichever is shorter. The required method of testing will be by cutting cores in the asphalt to verify not only compaction, but thickness as well.

48. Asphalt

If the Contractor elects to mill the asphalt, the millings cannot exceed two (2) inches in size, and shall be swept into the trench and re-compacted.

If the Contractor elects to saw-cut and remove the asphalt, the asphalt removed must be disposed of off-site at the Contractor's expense. The Contractor shall utilize aggregate base course (ABC) to backfill the trench to the level of the remaining asphalt.
It shall be the Contractor's responsibility to maintain the trench (swept, wetted, compacted, etc.) until the sewer main is installed. No separate payment shall be made for maintenance of the trench. The maximum allowable disturbed trench shall not exceed 3,000 feet. No trench shall be left un-patched for a period of time greater than sixty (60) days after initial asphalt removal.

The Contractor shall install pavement patch and street reconstruction in accordance with the applicable detail. The street crown shall be restored. The pavement patch and street reconstruction shall match existing pavement within +/- one-quarter (¼) inch. For NCDOT roadways, all pavement patching and street reconstruction shall be in accordance with the approved encroachment and applicable detail.

Immediately prior to patch paving, the trench sides shall be saw-cut straight. Damaged curb outside of the trench limits shall be removed and replaced at the Contractor's expense. The Contractor may excavate and grade the mainline for paving one (1) calendar day ahead of scheduled paving. The Contractor shall provide a smooth transition eliminating any vertical drop from the existing pavement to the cut-out trench at all times. Transitions shall be installed at manholes, the beginning and end points of the main line trench and all affected driveways. Transitions shall remain in place until the day patch paving occurs. Upon completion of the daily patch paving operation, the Contractor shall re-install any removed transitions until such time the paving operation resumes. If the paving operation does not resume within two (2) calendar days, all excavated trenches shall be backfilled unless otherwise approved by the Project Engineer. No separate payment for installation, maintenance, and removal of these transitions shall be made.

49. Mandrel Testing C900 PVC Sewer Mains

Mandrel Testing as specified in Section 02730 applies to both SDR 26 PVC and C900 PVC DR 18 sewer mains. For sizing the mandrel for AWWA C900 pipe, the Contractor shall utilize the procedure as defined in Uni-Bell's PVC Pipe Association Technical Brief "Sizing of Deflection Mandrels for AWWA C905 Pipe" and based on a maximum deflection of 5%. The technical brief can be referenced at https://www.uni-bell.org/communication/images/sizing_of_deflection_mandrels_for_awwa_c905_pipe.pdf .

The resulting mandrel sizes for 8-inch, 18-inch and 24-inch C900 PVC pipes will differ from the standard sizes for ASTM sewer pipe and may require custom fabrication. The Contractor shall be responsible for all costs in furnishing custom mandrels to complete the test on 8-inch, 18-inch and 24-inch C900 PVC DR 18 pipe segments. Contractor shall also submit product submittal data on the mandrels and the calculations to size the

mandrel for a maximum deflection of 5% consistent with the requirements of Section 01300-Submittals.

50. Manhole Insert Odor Control

The Contractor shall install manhole inserts for odor control where shown on the Drawings. Manhole inserts shall use activated carbon or another method approved by the Engineer to minimize odors through manhole vents.

Installation of the inserts shall not require modification of the manhole. The odor control method shall not require routine maintenance (other than replacement of media) or interfere with removal or replacement of the manhole cover.

Other odor control methods proposed by the Contractor may be considered pending approval by the Owner and the Engineer.

51. Streambank Armoring

The Contractor shall use rock riprap to create streambank armoring in locations specified in the drawings.

Slope shall be graded to 1.5:1 or flatter prior to placing filter, filter fabric, or rip-rap. Riprap shall be placed to maintain a uniform gradation. Larger stone shall be placed at the toe. Ends of the riprap shall be keyed into a stable bank.

52. Demolition

The Building Code of the State of North Carolina shall control the demolition, modification, or alteration of the existing buildings or structures.

No building or structure, or any part thereof, shall be demolished until an application has been filed by the Contractor with the Building Inspector and a permit issued. The fee for this permit shall be the Contractor's responsibility.

No blasting shall be done onsite unless specifically authorized in writing by the Engineer at least twenty-five (25) calendar days in advance. The Contractor shall not store any explosives onsite.

Contractor shall provide bypass pumping as necessary to remove existing lift station from service. Remove structure and roof (where applicable) and dispose offsite in accordance with local laws and regulations. Recycling is encouraged although not required. Remove lift Station pumps, motors, float systems, suction and discharge piping and valves, electric meter, electrical controls and components, antenna, Scada System, RTU, wet well cover slab and appurtenances. Clean and deliver removed items to PWC Warehouse on Old Wilmington Road.

Contractor shall take pictures of all equipment on site to be returned to PWC, prior to demolition activities. These pictures may be used to verify that equipment has been returned undamaged from its pre-demolition condition.

The Contractor shall coordinate with the appropriate electric utility to disconnect and remove electric meters. Electric meters shall be returned to the appropriate electric utility. Disconnect all electrical systems. Demolish all existing electrical conduits to 3' below grade and remove and de-terminate all wires back to source.

The Contractor shall coordinate with PWC to disconnect and remove water meters. Water meters shall be returned to PWC.

The Contractor shall coordinate with PWC at least thirty (30) calendar days prior to lift station demolition to prepare SCADA control systems and alarms. The Contractor shall disconnect field wires from existing RTU panel and turn hardware, control panel, and telemetry equipment over to PWC undamaged.

Wet wells to be demolished shall be perforated for drainage purposes at the bottom of the wet well. Demolish upper 2' of lift station wet well (or remove upper riser and deliver to PWC Warehouse on Old Wilmington Road). Fill wet well with suitable material from onsite. Place 4-6" topsoil from onsite materials, add amendments, seed, and mulch as specified in Sections 02933 and 02934.

All valves not removed from the site shall be left in an off position. Existing sludge feed lines and valves shall be demolished in their entirety. Existing water and wastewater pipelines shall be drained, plugged, and abandoned per Construction Demolition plan sheets. Existing underdrain systems shall be demolished to the extent necessary to achieve plugging of the existing drain system below grade. Drain system shall be abandoned in final condition with does not allow moisture to enter the drain lines due to infiltration or inflow.

Existing water services for each lift station shall be abandoned at the water main by closing the corporation stop and cutting and crimping or plugging the water service. Return the existing meters and backflow to PWC unless these are otherwise indicated to be disposed. Repair pavement in accordance with governing pavement detail where abandonment of water service requires pavement cut.

All demolished and removed material shall become the property of the Contractor unless specified otherwise. The Contractor shall dispose of removed material in a lawful manner. The storage or disposal of removed items on the site will not be allowed. Disposal costs shall be included in the Bid prices.

The Contractor shall exercise due concern for utility system operation during and following construction and shall diligently direct all activities toward maintaining continuous operation of existing facilities and minimizing operation inconvenience. Lift station demolition shall be coordinated with PWC operations and sequenced to minimize bypass pumping. All utilities being abandoned shall be terminated as required by the respective utility company or other owner.

All concrete, gravel, asphalt, or other constructed surfaces or equipment on site shall be removed unless otherwise specified. Contractor shall remove a minimum of the top eight (8) inches of fill material under prior construction. The remaining material may be abandoned in place with a minimum of eight (8) inches of clean backfill soil provided to restore the finish grade. Contractor shall then seed the site as specified in Sections 02933 and 02934.

Following demolition, the Contractor shall leave the site with positive grading so as not to inadvertently affect adjacent properties. Drainage from the site must either remain on site or flow to the nearest water course.

Submit to the Engineer (McKim & Creed, Inc.) for approval two (2) copies of proposed methods and operations of demolition and removal of structures and modifications seven (7) calendar days prior to performance of the work. Include the coordination of shut-off, capping, and maintenance of utility services as required. Provide a detailed sequence of the demolition and removal work. Actual work will not begin until the Engineer has inspected and approved the proposed work and

authorized commencement of the demolition. This procedure must be followed for each lift station removal.

53. Residential/Commercial Complaints

The Fayetteville Public Works Commission' Complaint Resolution Procedure shall be implemented at the start of construction and shall continue to be followed until the project is completed. The Contractor is required to maintain good public relations and to provide timely notifications to residents so as to minimize inconvenience and complaints.

The Fayetteville Public Works Commission has an established protocol for addressing residents' complaints. The Contractor shall be responsible for familiarizing himself and his subcontractors with this protocol. During the course of the Work, the Contractor shall immediately respond to requests from the Fayetteville Public Works Commission to address resident complaints. The Contractor shall inform his personnel and subcontractor personnel that all complaint issues be directed to the PWC Project Coordinator and the Contractor's Superintendent. The PWC Project Coordinator shall be present in all meetings with residents. Should the Fayetteville Public Works Commission determine the Contractor(s) non-responsive in addressing complaints, the Fayetteville Public Works Commission reserves the right to withhold progress payments until the complaint has been satisfied. The Contractor shall immediately notify the PWC Project Coordinator of any complaint received.

54. Claims Procedure

The Fayetteville Public Works Commission shall notify the Contractor of all potential claims related to the Work within seven (7) calendar days of receiving notification. Should the Contractor receive a potential claim related to the Work, the Contractor shall notify the Fayetteville Public Works Commission within seven (7) calendar days of receiving notification. The Contractor shall provide Claimant and Fayetteville Public Works Commission written response acknowledging receipt of the claim within seven (7) calendar days.

If the Contractor meets with the claimant about the claim, the Fayetteville Public Works Commission shall be present at all times. The Fayetteville Public Works Commission shall maintain a record of any claim received, and the steps taken to resolve. The Fayetteville Public Works Commission shall also concurrently investigate each case. The Contractor agrees to furnish the Fayetteville Public Works Commission any information regarding the claim, the actions which led to the claim and/or the investigation of the claim and agrees to indemnify and hold the Fayetteville Public Works Commission harmless for any damage arising out of said claims. Contractor shall provide their proposed response to the Fayetteville Public Works Commission within 30 calendar days of receiving the claim. Upon receipt of the response the Fayetteville Public Works Commission and the Contractor will discuss and reach a mutual agreement of the response necessary to send to the Claimant within 15 calendar days. Once the agreement is made the Contractor shall make a formal written resolution to the claimant.

Failure to act in good faith or respond to a claim in the timelines established the Fayetteville Public Works Commission will constitute a lack of response by the Contractor, therefore validating the claim. The Fayetteville Public Works Commission will deduct the total amount of the claim from the monthly pay application. Failure to comply with the above requirements for resolving claims may, at the sole discretion of the Fayetteville Public Works Commission, result in Breach of Contract.

The Contractor is aware of the Fayetteville Public Works Commission's Contractor Related Claims Procedure and understands that it is the Fayetteville Public Works Commission's practice to pursue reimbursement/subrogation for any and all claims related expenses, which are incurred as a result of the Contractor's performance under this agreement and allowed within the applicable Statue of Limitations.

55. Collateral Damage

All collateral damage shall be sodded back at the Contractor's expense. Collateral damage areas are locations where the Contractor's equipment, spoil piles, materials, etc., have disturbed lawns and other areas outside of their work. The Contractor shall not restore collateral damage locations with seed. Damaged trees shall be trimmed and treated with a tree dressing.

The Contractor shall not encroach beyond the limits of the Fayetteville Public Works Commission's property or rights-of-way. The Contractor shall be solely responsible for any damage to property resulting from failing to locate prior to beginning construction.

56. Rights-of-Way and/or Easements

Deeds, grants, encroachment permits, and rights-of-way easements for necessary property will be secured by the Owner. Any additional access right-of-way shall be the responsibility of the Contractor. The Contractor shall be liable for all damages resulting from access usage.

If Work is delayed by reason of the inability of the Owner to promptly secure the necessary property or rights-of-way, the Contractor shall have no claim for loss due to such delays. The Contractor will be required to work in areas where easements have been secured and stopping work to move to various locations may be required. No payment shall be made for any mobilizations within the project limits. If the Project Engineer determines work cannot continue, the Contractor shall have no claim for loss due to such delays, but the time of completion may be extended accordingly.

The Contractor shall locate the limits of the rights-of-way, or property lines prior to beginning construction and shall not encroach beyond those limits. The Contractor shall be solely responsible for any damage to property resulting from failing to locate these limits prior to beginning construction.

If the Owner has not obtained all of the required easements at the time of advertisement, a list of those properties where an easement has not been obtained will be located in the Appendices of these Contract Documents. The Contractor shall not enter those properties where easements are not obtained. Once the easements have been obtained, the Owner will notify the Contractor. Any special conditions resulting from the easement acquisition will be provided to the Contractor in writing. The Contractor shall comply with all easement special conditions.

57. NCDOT Right-of-Way

The Contractor shall not begin work within any NCDOT rights-of-way until the Owner has obtained the necessary encroachment(s). Copies of the approved encroachments are contained within Appendices of these Contract Documents. The Contractor shall conform to all requirements of the approved NCDOT encroachment permit. Prior to any construction

within NCDOT rights-of-way, the Contractor shall notify the District Engineer's Office in accordance with the approved encroachment. A copy of the approved encroachment agreement/permit shall be kept on the job site at all times and made readily available if requested. The NCDOT reserves the right to stop any work for noncompliance without claim for extra compensation.

All costs to comply with the terms of the approved NCDOT encroachment shall be the responsibility of the Contractor.

58. Waste Disposal

The Contractor shall properly dispose of all debris resulting from their operations, in accordance with applicable Federal, State, and local laws, regulations, and rules.

59. Disposition of Surplus Property

All property which is surplus to the needs of the project will remain or become the property of the Contractor, unless otherwise stated in the plans or Contract Documents. All property belonging to the Contractor shall be removed from the project by the Contractor prior to final acceptance.

60. Chemical Uses

All chemicals used during project construction or furnished for project operation, whether herbicides, pesticides, disinfectant, polymer, reactant or of other classification, must show approval of either the Environmental Protection Agency or the USDA. Use of all such chemical and disposal of residues shall be in strict conformance with manufacturer's instructions.

61. Contractor's Responsibility for Work

Until final acceptance by the Fayetteville Public Works Commission, the project site and all the Work shall be the responsibility of the Contractor. The Contractor shall take every precaution to prevent damage to the project site, Work, and the surrounding areas. It shall be the responsibility of the Contractor to address any damage or injury arising from their direct or indirect performance on this project. The Contractor shall be responsible for maintaining the project site at all times, as required by these Contract Documents. The Contractor shall also be responsible for ensuring that the Work is installed and maintained in accordance with these Contract Documents until accepted by the Fayetteville Public Works Commission. This paragraph does not supersede the requirements of the general warranty.

62. Coordination of Work

The Contractor shall maintain unobstructed access to all areas for other Contractors. The Contractor is required to conduct his operations in a manner that will not interfere with or damage work that is being performed by others. The Contractor shall coordinate his operations in a manner which will facilitate the progress of work in adjacent areas. Contractor shall be prepared to coordinate their operations with the following other projects that may overlap this project including:

A. NCDOT U2519BA (Projected let date in late spring/early summer 2022)-Contractor shall not enter or access and part of NCDOT U2519BA and its dedicated right-of-way. Contractor shall coordinate all boring and jacking operations with NCDOT's Division 6 Utility Coordinator (Randy Rogers) a minimum of 14 calendar days before starting work. All work shall remain outside NCDOT's controlled access right of way.

B. PWC's Well Relocation along Lakeview Drive-Contractor shall coordinate with PWC's contractor that will be performing well relocations and abandonments along Lakeview Drive and not impede their ingress and egress. It is anticipated that the well relocations and sewer installation along Lakeview Drive will be concurrent.

Any conflicts or interference that cannot be resolved through direct communication with other Contractors working on the site shall immediately be brought to the Project Engineer's attention for resolution. The Project Engineer's decisions regarding resolution of conflicts between Contractors shall be final and binding. The Contractor shall not claim extra compensation for delays caused by other Contractors unless such delays are clear violations of a prior coordination agreement facilitated by the Owner.

63. Responsibility for Material

All pipe, fittings, manholes, and other materials shall be inspected upon arrival at the job site by a competent superintendent before unloading to ensure that the quality of the materials conform to the specifications. All materials shall be subject to inspection by the Fayetteville Public Works Commission. Materials found to be defective shall be clearly marked to assure the necessary repairs are made, if approved by the PWC Project Coordinator. If approved, the material is incorporated in the work or replaced with sound material without additional expense to the Fayetteville Public Works Commission.

Pipe materials improperly installed shall not be utilized for re-installation. Contractor will be solely responsible for obtaining new pipe material for re-installation.

64. Water Outages

The Contractor shall schedule a coordination meeting with the Fayetteville Public Works Commission a minimum of three (3) working days prior to any planned water outage. The coordination meeting shall be conducted prior to any notices being issued. Additionally, the Contractor shall locate (vertically and horizontally) any utilities within the work area, in accordance with these Contract Documents. The locations of all utilities within the work area shall be determined prior to the coordination meeting. Any conflicts with the pending work and the existing utilities shall be identified, and a plan for resolving any conflicts shall be presented. The purpose of this coordination meeting is to ensure that the Contractor has a good understanding of the requirements related to the pending outage, verify that there are no utility conflicts that will prevent the work from being completed, all equipment is in good working order, all equipment is functional, all materials are on site, all necessary tools are on site, discuss any necessary contingency plans, and any other items necessary to ensure that the Fayetteville Public Works Commission has confidence that the work can be accomplished within the given time period. Should, for any reason, the Fayetteville Public Works Commission deem that the Contractor is not prepared for the proposed outage, the outage notifications will not be distributed, and the outage shall be postponed a minimum of two (2) weeks. The Fayetteville Public Works Commission will provide written notification to the Contractor of this decision. No additional contract time will be granted for this delay. Should the contract time expire within that two (2) week period, the Fayetteville Public Works Commission reserves the right to assess liquidated damages, as outlined in these Contract Documents.

Once the water outage notifications have been issued, a follow-up coordination meeting with the Fayetteville Public Works Commission shall be held a minimum of 24 hours prior to the scheduled outage. The purpose of this meeting is to verify that the Contractor is prepared to proceed with the

outage, and that all equipment, materials, tools, and all other incidentals are on the project site and functioning. If for any reason the Fayetteville Public Works Commission deems that the Contractor is not prepared, the outage shall be postponed, and all customers immediately notified of the cancellation. The outage shall be postponed a minimum of two (2) weeks. No additional contract time will be granted for this delay. Should the contract time expire within that two (2) week period, the Fayetteville Public Works Commission reserves the right to assess liquidated damages, as outlined in these Contract Documents.

The Contractor shall complete the required work and restore water service within the given time period for the outage. Should the Contractor fail to complete the work within the allotted time, the Fayetteville Public Works Commission shall assess a penalty of $500 per 15-minute interval or any portion thereof until water service is restored. This penalty will be deducted from the Contractor's pay application or be billed directly to the Contractor. The penalty may be waived for circumstances beyond the Contractor's control, as deemed by the Fayetteville Public Works Commission. The Fayetteville Public Works Commission reserves the right to cancel or postpone the outage at any given time, for any given reason.

NOTE: THIS REQUIREMENT DOES NOT APPLY TO THOSE WATER MAINS OWNED BY AQUA AMERICA THAT MAY REQUIRE OUTAGES.

65. Project Schedule

The Contractor shall provide the Fayetteville Public Works Commission a project schedule, in accordance with Section 01310 – Construction Schedule, and the requirements of this paragraph. Each week, the Contractor shall provide the Fayetteville Public Works Commission with their schedule for the upcoming week. The Contractor shall contact the PWC Project Coordinator on a daily basis, to confirm their schedule for that day. The Contractor shall immediately notify the Fayetteville Public Works Commission of any deviations to their schedule. Failure to notify the Fayetteville Public Works Commission of any deviations may result in payment being withheld.

66. Resident Notification

Whenever the property owner's use of the sanitary sewer must be interrupted by the Work, the Contractor shall notify the residents a minimum of 48 hours in advance of the interruption. This notification shall be accomplished with door hanger notification cards placed at the addresses of the affected residents. Property owners shall be informed when service interruption takes place and the expected duration. This notice shall be a minimum 48 hours prior to service interruption. The Contractor shall make every effort to minimize inconvenience to the public and property owners.

Service interruptions to residents shall be limited to no more than eight (8) hours at any given time.

The notifications shall describe the work to be undertaken and approximate dates of the work. The text of the notifications shall be approved by the Fayetteville Public Works Commission in advance of the beginning the Work. The Contractor shall provide a copy of the notification to the Fayetteville Public Works Commission each time such notification is issued to the affected customers.

67. Replacement of Fencing

The Contractor is to replace any fencing disturbed as part of their operations for the work described within these Contract Documents. Replacement of fencing is considered incidental to the operation, and no additional payment will be made for this work. In addition, if temporary fencing is required,

the Contractor shall provide such fencing as necessary, at no additional cost to the Fayetteville Public Works Commission. Fences shall be removed and replaced, using new materials as required, to restore the item to the original condition or better.

68. Installation of Gates at Easement Crossings

If existing fencing crosses a new or existing sewer easement within the project limit of disturbance, the Contractor is to install a gate at that easement crossing. The gate shall be of the same material as the existing fence to be replaced, and shall be as visually unobtrusive as possible. The gate shall be as wide as the new or existing sewer easement that crosses the fence. No separate payment for gate installation except on new accesses.

69. Confined Space

Prior to entering manholes or other areas that are defined as confined spaces, the Contractor shall follow all requirements and procedures as outlined by OSHA's Confined Space Entry requirements. A confined space entry program shall be included as part of the Contractor's Safety Plan.

70. Excavation

The Contractor shall be responsible for utilizing all measures necessary to comply with the applicable OSHA regulations.

Before excavating, the Contractor shall contact the NC One-Call Center for the location of existing utilities within the project area. Costs of utility repairs, temporary service and other costs resulting from damage to or interruption of utilities, resulting from operations under this contract, shall be done by Contractor at no additional cost to the Fayetteville Public Works Commission.

Prior to excavation, the Contractor shall sawcut and remove asphalt or concrete pavement within the limits of allowable trench width. Where the excavation is within grassed easement areas, the Contractor shall take care to minimize disturbance and/or removal of trees, shrubs, bushes, etc.

71. Protection of Property

The Contractor shall carefully protect from disturbance or damage all private property and property corners. When any damage or injury is done to public or private property, by or on account of any act, omission, neglect, or misconduct in the execution of the Work, or in consequence of the non-execution thereof on the part of the Contractor, the Contractor shall restore, at no cost to the Fayetteville Public Works Commission, such property to a condition equal or better to that existed prior to construction, or the Contractor shall make good damage or injury in an acceptable manner.

The Contractor shall solely be responsible for damage to property outside the limits of the Work. Any and all additional access rights-of-way shall be the responsibility of the Contractor. The Contractor shall be liable for all damages resulting from access usage.

Upon request from the property owner, the Contractor shall remove and set aside those plantings identified by the property owner. All plantings to the salvaged shall be placed at the edge of the existing easement. It will be the property owner's responsibility to re-plant those items saved.

The Contractor shall take all necessary measures to protect property within the existing easement during all phases of his activities. Tree branches and ornamental shrubbery shall be temporarily tied back to avoid damage. Damage to trees shall be trimmed and treated with a tree dressing.

72. Pre-Construction Conference

There will be a Pre-Construction conference following the issuance of Notice of Award. The Fayetteville Public Works Commission will contact the Contractor to establish a mutually agreeable date and time to conduct the conference. The purpose of the conference is to discuss general project items, including, but not limited to:

- Contractor's responsible person and contact information
- Emergency contact information
- Submittal schedule and requirements
- Contract requirements
- Safety
- Access and/or Coordination issues
- Project schedule (including Notice to Proceed)
- Sales Tax Certificate
- Applications for Payment
- Warranty requirements
- Site restoration and clean-up
- Coordination with Piedmont Natural Gas
- Coordination with Duke Energy

73. Claims for Extra Cost

Should the Contractor consider that as a result of any instructions given in writing by the PWC Project Engineer, he is entitled to extra costs above that stated in the Contract; the Contractor shall give written notice to the PWC Project Engineer. The written notice shall be sent to the PWC Project Engineer within seven (7) calendar days after the occurrence of the event and the Contractor shall not proceed with the work affected until further advised, except in an emergency involving the safety of life or property. No claims for extra compensation will be considered unless the claim is made. Extra Work performed by the Contractor, not approved by the PWC Project Engineer in writing shall not be considered for payment.

The Contractor shall not act on instructions received by him from person's other than the PWC Project Engineer and/or the PWC Project Coordinator. Any claims for extra compensation or extension of time on account of unauthorized instruction will not be honored. The PWC Project Engineer will not be responsible for misunderstandings claimed by the Contractor of verbal instructions which have not been confirmed in writing, and in no such case shall instructions be interpreted as permitting a departure from the Contract Documents unless such instruction is confirmed in writing by the PWC Project Engineer.

74. Authorized Changes in the Work

At any time, the PWC Project Engineer may request, in writing, that the Contractor submit a proposal (Change Order Request), for a proposed change in the work. Within ten (10) business days after receipt of a written Change Order Request, the Contractor shall submit to the PWC Project Engineer a written detailed proposal for the change. The detailed proposal shall include an itemized estimate of all costs that will result directly or indirectly from the proposed change and include an assessment of the impact of the proposed change on the overall project schedule. Proposals shall be sufficiently detailed to reasonably permit an analysis of all material, labor, equipment, subcontractor costs, overhead costs, and fees, and shall cover all work involved in the change such as work was deleted, added, changed, or impacted. Each cost category shall be

supported with substantiating documentation which may include, but is not limited to, quantity takeoffs, quotations, invoices, cost records, and certified payroll. If the PWC Project Engineer elects to proceed with the change covered by the Change Order Request, such change will be authorized by execution of a Change Order at a later date. Notwithstanding the Change Order Request, the Contractor shall carry on the Work and maintain the progress schedule. The PWC Project Engineer shall have 20 business days after the receipt of the detailed proposal to respond in writing. Delays in submittal of the written detailed proposal are at the expense of the Contractor.

75. Extension of Contract Time

If the Contractor is delayed during the progress of the Work by any causes beyond the Contractor's control; and/or by any other causes which the PWC Project Engineer determines may justify the delay, then the contract time may be extended by Change Order for the time which the PWC Project Engineer may determine to be reasonable. All extensions to the contract time shall be granted in full calendar days. If, at the end of the Contract, the final completion date falls on a non-workday, the PWC Project Engineer, may, at their sole discretion, grant additional calendar days so that the final completion date is a work day.

Request for time extensions shall be made in writing within 30 calendar days following the cause of delay. In cases of continuing cause of delay, only one (1) claim is necessary. Failure to make written requests within the allowed time frame shall waive the Contractor's ability to make future claims for that specific instance which expired. Requests for time extensions for weather delays do not entitle the Contractor to "extend overhead".

- Change in Work delays – Change in work delays are defined as delays due to changes in the Work that alters the original scope of the Contract and impacts the critical path (i.e., delays the controlling operation). Additional calendar days may be granted by the PWC Project Engineer for work assigned to the Contractor through a change order; provided that the Contractor's critical path is impacted by the change in work. The additional time shall be based on the actual number of calendar days that the critical path (i.e., controlling operation) is delayed, as determined by the PWC Project Engineer. The PWC Project Engineer may extend the contract time based on the estimated number of calendar days to complete additional work that does not adversely impact the critical path.

- Weather delays – Weather delays are defined as any event that affects the standard daily production for 50% or more of the Contractor's scheduled workday. Weather delays shall be based on the actual precipitation received (i.e., inches of rain), the time the precipitation occurred, and the PWC Project Coordinator's observation. Weather days shall not be granted for weather that occurs during non-work hours, including weekends and/or holidays; unless it affects the Contractor's standard daily production for 50% or more of the following scheduled work day. Weather days shall be determined at the PWC Project Engineer's sole discretion. Throughout the Contract, the Contractor shall record the occurrence of weather and the resultant impact to the scheduled work.

76. Change Orders

The Fayetteville Public Works Commission may have changes made in the work covered by the Contract. These changes will not invalidate and will not relieve or release the Contractor from any guarantee given by him pertinent to the Contract provisions. These changes will not affect the validity of the Payment Bond and Performance Bond nor will it relieve the Surety or Sureties of said Bond. All extra work shall be executed under the conditions of the original contract, unless otherwise specified in the approved Change Order.

Except in an emergency endangering life or property, no changes shall be made to the Contract except upon written notice from the PWC Project Engineer authorizing such change, and no claim for adjustments of the contract price shall be valid unless this procedure is followed.

Adjustment in Contract Price and/or Contract Time stated in a change order shall comprise the total price and/or time adjustment due to or owed to the Contractor for the Work or changes defined in the Change Order. By executing the Change Order, the Contractor acknowledges and agrees to the Change Order, incorporating all cost and delays associated with the interruption of schedules, extended overheads, delay, and cumulative impacts or ripple effect, on all work under this Contract. Signing of the Change Order constitutes full and mutual accord and satisfaction for the adjustment in the contract price and/or time as a result of increases or decreases in costs and time of performance caused directly and indirectly by the change. Execution of the Change Order represents an equitable adjustment to the contract price and/or time and that the Contractor waives all rights to claim further adjustments related to the Change Order.

If during the progress of the Work, the PWC Project Engineer requests a change order and the Contractor's terms are unacceptable, the PWC Project Engineer without prejudice may perform or have performed that portion of the work requested by others or with the Fayetteville Public Works Commission's own forces.

77. Final Inspection/Acceptance of Work

When the PWC Project Coordinator deems the project completed and ready for final inspection, the PWC Project Coordinator shall notify the PWC Project Engineer. During the final inspection any items documented shall be compiled in a final punch list and provided to the Contractor within five (5) business days. The Contractor shall be required to complete each item in the final inspection punch list within 30 calendar days of receipt. Failure to complete the punch list in that time may result in liquidated damages being assessed. The project will not be considered complete until all punch list items are completed and accepted, unless otherwise determined by the PWC Project Engineer. All punch list items shall be completed prior to release of final payment. Once the deficiencies have been addressed to the Fayetteville Public Works Commission's satisfaction, a final acceptance letter will be issued to the Contractor.

Prior to the final inspection, the Contractor shall complete the following:

- Place a green paint mark at the curb, indicating the location of the sewer lateral. The paint shall be heavily applied, so that the paint will last.
- All manholes having camlock ring and covers shall be locked.
- Place a PWC issued marker at all valves, manholes, and air release valve manholes outside of pavement as directed by the PWC Project Coordinator.
- Verify all plugs have been removed.
- Complete all restoration.
- Complete all required testing.

No separate payment shall be made for this work.

FINAL COMPLETION DOCUMENTATION

Prior to receiving final payment, the Contractor shall complete and/or provide the following:

- Complete all punch list items to the satisfaction of the PWC Project Engineer.
- Satisfactorily resolve all customer complaints and obtain the required releases.

- Provide project record drawings, in accordance with Submittals Section 01300; and
- Provide project close-out submittals in accordance with Submittals Section 01300.

78. Record Drawings

Upon completion of the Work, the Contractor shall provide two complete sets of drawings recording all changes to the work to indicate actual installation. Changes shall be noted in legible red letters. These changes shall include but are not limited to the following:

- Change in pipe material
- Size, depth, and installed elevations of gravity sewer pipe
- Location of valves, laterals, blow-offs, and other appurtenances
- Demolition of existing lift stations

Completion of the Contractor's record drawings is a specific contract requirement, and final payment will not be made until these drawings have been submitted to the PWC Project Engineer in an acceptable form.

79. Review of Contractor Pay Requests

Prior to the Contractor submitting an application for payment, the Contractor and Fayetteville Public Works Commission shall review and agree on all items and quantities that the Contractor is requesting payment for. Each pay request shall contain a certificate documenting any sales tax paid by the Contractor for that billing period. *A certified form is required even if no sales tax was paid for that pay request period.*

Final payment and release of retainage will not be made until:

- all testing requirements have been satisfactorily met,
- the Fayetteville Public Works Commission has completed a final inspection of the work,
- all deficiencies noted in the final inspection have been satisfactorily addressed,
- all necessary site restoration has been completed, and
- all required documentation (reports, release of liens, Property Owner release, etc.) has been submitted.
- all red-lines have been verified by the PROJECT ENGINEER.

The Contractor is strongly urged to submit draft pay applications to the Fayetteville Public Works Commission prior to submittal of the official pay application. The Fayetteville Public Works Commission will review and provide any comments on the draft pay application within five (5) business days. Draft pay applications can be either emailed or faxed.

It is expected that the pay application will have a cover sheet similar to AIA Form G702 (or approved equal) that summarizes the contract value, any change orders, and work completed to date. The Contractor shall furnish two (2) copies (one original and one copy) of the pay request. The Contractor shall include copies of all invoices claimed on the sales tax certification.

80. Septic System Conflict and Resolution

Contractor shall repair any damage to septic tank and/or drain field to existing or better condition in accordance with all local and state regulations, immediately upon occurrence of damage during construction of sewer improvements. Contractor shall pump and haul septic contents as necessary during the interim between septic system damage and repair. No separate payment.

81. Replacement of PWC Water Services

The Contractor shall replace the existing water services that are damaged as a result of their operations in accordance with PWC standards. Damaged water services shall be replaced from the meter to the existing main utilizing copper tubing and all new fittings. The Contractor shall properly abandon the existing tap, and install a new tap, utilizing a new tapping saddle and corporation in accordance with PWC standards.

The Contractor shall be responsible for connecting the new tailpiece to the customer's existingservice utilizing brass fittings. The Contractor is responsible for all necessary fittings in order to connect the copper tubing to the existing meter.

The existing meter boxes shall be replaced as part of the renewal of the water services. A composite, H-20 rated meter box shall be used if the meter is to be located in asphalt or concrete. The Contractor shall be responsible for furnishing and installing the meter boxes. All work shall be approved by the Project Coordinator.

Should the Project Engineer determine that an existing water service be replaced, the Contractor shall replace that service in accordance with the requirements contained within this provision.

82. Replacement of Water Services (Aqua)

The Contractor shall replace the existing water services that are damaged as a result of their operations, with 1-inch polyethylene CTS, 200 PSI pipe for doubled services. Should the service encountered be a single service, it shall be replaced with ¾-inch CTS 200 PSI pipe.

The services shall be replaced main to meter. In accordance with AQUA America requirements, no couplings shall be used on service lines. Single strap saddles made of brass shall be used with brass compression corporation stops. All water laterals shall have at least three (3) feet of cover.

Should the Contractor's operations damage properly marked services, they shall be replaced at no cost to AQUA America or the Owner. If services are not properly marked the Contractor will need to seek reimbursement through AQUA America.

The Contractor shall properly abandon the existing tap, and install a new tap, utilizing a new tapping saddle and corporation. The Contractor is responsible for all necessary fittings in order to connect the new service to the existing meter. The Contractor shall be responsible for furnishing and installing meter boxes. All work shall be approved by the Project Coordinator and AQUA America.

83. Special Provision to Section 02111 Site Clearing and General Note 15 on Sheet G-1

A. Unless otherwise stipulated by an easement special condition or provision, the full width of the permanent easement shall be cleared and grubbed.
B. The same requirements apply to permanent easements within jurisdictional wetlands, but the clearing operations shall not change or alter the contour of the wetlands and shall

abide by all requirements set forth in the Nationwide Permit and Water Quality Certification.

C. Clearing and grubbing of the temporary construction easement shall be **only as absolutely necessary**.
D. The Contractor shall be permitted to grind growth including trees, stumps, logs and roots; organic material, and other debris or items that interfere with construction operations into mulch material.
E. Mulch material shall be considered unsuitable for backfill or ground cover within the permanent utility easement and temporary construction easement, unless otherwise noted on the plans. All unused mulch material must be properly disposed of.
F. Any foreign material including, but not limited to, unsuitable material, junk, concrete, and other debris that cannot be used as groundcover or backfill and resulting from the Contractor's operations shall be disposed in accordance with applicable Federal, State, and local laws, regulations, and rules.

84. Special Provisions to Section 02301 Boring and Jacking

All specified trenchless installations shall be guaranteed unless otherwise specified on the drawings or on the Bid Form. The following requirements define trenchless installation:

A. The casing type and characteristics shall be in accordance with Section 02301 unless otherwise noted on the Drawings.

B. Contractor shall select installation methods appropriate for anticipated soil and groundwater conditions and meet the following:

    a. Allows encasement and carrier pipe to be installed to desired line and grade. For gravity sewers, grade and alignment may not vary from specified design on the Drawings.

    b. Prevents heaving or settlement of ground surface and damage to nearby and adjacent facilities and roadways

    c. Prevents damage to carrier pipe and any lining materials within carrier pipe

C. Provide groundwater control and removal as appropriate for the method of excavation and installation. Remove the groundwater using an engineered dewatering system. Keep surface waters and drainage out of the excavation pits.

D. Sequence work and excavation to conform to traffic control requirements.

E. Submit plan for trenchless operation to PWC. If trenchless installation is contained within NCDOT right of way and if it is not pre-approved or an acceptable installation method as defined in current NCDOT standard specifications (Section 01550), Contractor is responsible for all obtaining encroachment modifications. The Contractor's failure to advance an engineering plan of a trenchless installation for NCDOT review and approval and submit a minimum 120 calendar days prior to initiating the trenchless installation shall not be cause for claim of lost time or for additional compensation. No additional payment will be made for re-mobilization required by the trenchless subcontractor.

F. Conduct a pre-construction meeting with PWC and NCDOT (if installation is contained within NCDOT right of way) a minimum of 48 hours before beginning installation. Contractor shall review the following elements of the installation:

   a. Outlook of soil conditions and how method addresses any specific challenges or constraints imposed by soil conditions

   b. Outlook of groundwater conditions and how dewatering addresses any challenges or constraints imposed by groundwater

   c. Confirming that appropriate equipment and materials are on site

   d. Providing a progress schedule

   e. Defining ability to react to failures and or roadway/ground surface settlement

85. Special Provisions to Section 02730 Sanitary Sewer Systems

A. Manholes that lie inside wetlands and that are within 50 feet of an abutting wetland (stream classification B or a stream of higher quality) shall be provided:
   a. External joints wrapped for additional protection against infiltration.
   b. Manhole shall be cast with the concrete admixture as specified in Section and be provided a waterproof and corrosion resistant coating as specified in Section

B. All installation of C900 PVC DR 18 sewer shall be per SS-3-Typical Trench Bottom and Backfill Detail on Sheet D-2. Detail SS-3, therefore, is applicable to both SDR 26 PVC and C900 PVC DR 18.

C. Where SDR 26 PVC is shown on the drawing, it must conform to ASTM F-679 and have a pressure stiffness class of 115. It shall not be an acceptable PVC option where the sewer crosses through a wetland or where the sewer is within 50 feet of abutting wetland that has a stream designation as Class B or of high quality.

D. C900 PVC shall be minimum pressure class 235 psi and DR 18.

E. All ductile iron sewer pipe (push on) for diameters 18-inches and 24-inches shall meet Pressure Class 250 requirements. All ductile iron (restrained joint) for diameters 18-inches and 24-inches shall meet Class 350 requirements.

F. All ductile iron sewer pipe (push on and restrained joints) for diameters 8-inches and 12-inches shall meet Class 51 requirements.

86. Hold Harmless for NCDOT STIP U2519BA/BB

For installation of the portion of the Pear Tree Estates Lift Station Elimination Outfall (Sheet C36A), NCDOT has been indemnified and held harmless from any claims, damages, or

delays arising from this work that could impact NCDOT's construction of I-295. If any such damages or delays are caused, PWC is responsible for providing adequate compensation. Also, PWC is responsible for scheduling work during a time in which it does not affect NCDOT's contractor's construction activities. From the time of Notice to Proceed to the completion of Big Rockfish Creek Sanitary Sewer Outfall (BRCO) Contract 2, this Hold Harmless responsibility is transferred from PWC to the Contractor awarded with the contract of BRCO Contract 2. The awarded Contractor is responsible for providing adequate compensation for any claims, damages, or delays arising from the BRCO Contract 2 work, and the Contractor is responsible for scheduling work during a time in which it does not affect NCDOT's contractor's construction activities.

*** END OF SECTION **

DIVISION 1
GENERAL REQUIREMENTS

01025 – MEASUREMENT AND PAYMENT

GENERAL

A. The purpose of this Section is to define the methods of measurement and payment for each of the unit prices and/or lump sum prices listed in the Bid Form, which are required to construct the Work. Payment will be made based on completion in a satisfactory manner of the specified items included in the description in this Section for each Bid Item. Not all Work required, significant, or incidental, is identified in this Section or in the Bid Form. Where Work is shown on the Drawings and/or specified in the Contract Documents, but not specifically described in this Section or is incidental to or affiliated with the Work as described, the Work shall be deemed to be included in the value of the Work described in the Pay Items with which the Work is most closely associated. All Work so shown or specified is included in these payment items.

B. The unit price and/or lump sum price bid shall be full compensation for the work required under each bid item, which shall include all incidental costs relative thereto. Certain items of work are specified and/or shown as a detail in the Contract Documents; bid prices shall include all items of work required to furnish and/or install each in accordance with the Project requirements, whether specifically stated or itemized in the Measure and Payment description.

C. Certain bid items have been designated to conform to maximum payment widths and/or lengths and no additional payment therefore will be allowed unless otherwise approved by the Fayetteville Public Works Commission (PWC). These designated items will be as identified in the Bid Form, Technical Specifications and as may be indicated on the Drawings. The designation of these items of work shall be noted as “No Overage Allowed” or “NOA”. Prospective bidders shall be responsible for verifying that the actual quantities of work are listed in the Bid Form prior to submitting bids, and include all costs (regardless of whether the Bid quantities are over or under the quantities indicated on the Drawings) in the unit price bid.

LUMP SUM PAYMENT ITEMS

1. Mobilization

A Lump Sum Payment less than or equal to 3% of the Total Bid Price (to include all bonds, insurance, move on expenses, etc.) will be allowed for 'mobilization and demobilization' as a progress payment line item. The actual cost of bonds and insurance (up to the maximum payment of 3%) will be considered in the initial payment request provided that cost documentation suitable to the PWC Project Engineer is furnished by the Contractor. Any outstanding balance of the mobilization and demobilization Pay Item will be payable when the Project is determined to be 10% complete as indicated by the approved progress payments (less cost of mobilization).

2. Traffic Control & Traffic Control Plan

The lump sum prices bid under the Bid Form shall include all costs for the preparation and implementation of required traffic management plans, furnishing, installing and maintaining traffic

control signage and devices, relocating or removing signs or other traffic control devices, replacement of street signs, replacement of traffic signal loops, and all other incidental work throughout the project site, throughout the project duration. The Contractor shall coordinate his activities so as to minimize disruption of traffic and inconvenience to residents and the general public. All such traffic control devices, signage, traffic patterns and road closures shall be approved by the City of Fayetteville, the Town of Hope Mills, and/or NCDOT as appropriate. All traffic control measures outside of public rights-of-way shall be by approved the PWC Project Engineer.

Payment under the lump sum prices shall be made as follows:

(1) 25% of the Lump Sum Price when the Project work is 10% complete as indicated by approved progress payments.

(2) 50% of the Lump Sum Price when the Project is 50% complete as indicated by approved progress payments.

(3) 100% of the Lump Sum Price when the Project is 80% complete as indicated by approved progress payments.

Prospective bidders are advised that failure to provide and maintain adequate traffic control devices and/or signage may result in the PWC Project Engineer's refusal to make payment until corrective measures are in place. Improper signage and/or traffic control measures will not be allowed. The City of Fayetteville, the Town of Hope Mills, NCDOT, and/or PWC reserves the right to relocate and/or remove such non-conforming signs and devices, setup proper signage to ensure public safety, and deduct all costs for these items which may be incurred by PWC. The Contractor shall make no claim for any such work performed.

3. Allowance for "Third Party" Vibration Monitoring

The lump sum prices bid under the Bid Form shall include all costs for performing vibration monitoring during backfill activities in residential areas or during blasting activities. This item shall cover all costs of third-party vibration monitoring, including labor, materials, and incidentals. The Contractor shall be responsible for coordinating and employing the testing firm that will perform the vibration monitoring and coordinating with the Project Coordinator a minimum of three days before initiating the tests.

This item is exclusively for vibration monitoring. Soil compaction, asphalt, subgrade and other material testing shall be performed by Public Works Commission's Testing Consultant, and the cost of these tests shall be paid by Public Works Commission. Any costs associated with retesting of failed tests is the Contractor's responsibility. The allowance for Payment Item L-3 shall be utilized to cover all costs for performing vibration monitoring during excavation and backfilling activities in residential areas or during blasting activities. The Contractor shall be responsible for coordinating and employing the testing firm that will perform the vibration monitoring and coordinating with the Project Coordinator a minimum of three days before initiating the tests.

4. Lift Station Demolition

The lump sum prices bid under the Bid Form shall include all costs for the preparation and implementation of complete or partial demolition of lift station(s) in accordance with these Contract Documents. This price shall include coordination with PWC and other utilities to disconnect utilities and return meters as required; excavation; demolition; draining and/or abandonment of existing lines; disposal of demolished materials; cutting, capping, plugging, grout filling and abandonment of existing pipes and conduits; patching asphalt in accordance with standard pavement repair detail or in accordance with entity that maintains the street (NCDOT, City of Fayetteville or Town of Hope Mills) for any pavement cuts required to properly abandon existing utilities; and safe removal, transport and return to PWC of various items as specified by the Contract Documents; as well as all other items associated with safe demolition, abandonment, and removal of materials from the demolition site in accordance with North Carolina regulations and PWC Specifications. This item shall also include site restoration, including grading, backfill, seeding, mulching, sod, hardscape restoration (including asphalt pavement restoration) or any other items associated with restoring the site as specified in the Contract Documents.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel, lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

Payment shall be made after demolition and restoration activities are complete at each lift station site.

UNIT PRICE ITEMS

SANITARY SEWER MAIN INSTALLATION

5. Install “Owner Furnished” Polyvinyl Chloride (PVC) SDR-26 Sewer Pipe (Open Trench)

This item shall be measured by actual linear feet of gravity sanitary sewer pipe installed, complete, in place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with manhole structures. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the gravity sanitary sewer pipe as indicated on the plans and in accordance with PWC standards, at each depth class as listed in the Bid with depth measured vertically from pipe invert to original grade. The unit price shall not include sanitary sewer pipe installed by bore and jack or for aerial crossings. This unit price shall not include the material price of the sanitary sewer pipe as it will be furnished by PWC. This unit price shall not include the transporting of the “Owner furnished” pipe from Owner’s storage yard to the Contractor’s staging yard as this cost shall be included in Item U-2.

Work shall include all costs for clearing and grubbing, excavation (including exploratory excavation), bracing, shoring, sheeting, backfill, compaction, cutting and removal of pavement, and protection and adjustment of aboveground and underground utilities and service connections. Work shall also include furnishing and installation of fittings, coatings, detection wire, and bedding material at the specified line and grade. Work shall include replacement of fencing, support of nearby structures, and shoring where necessary. Work shall also include de-watering, CCTV, coordination with the PWC Project Coordinator, testing, inspection, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work. Payment under this line item shall include all costs necessary to perform the required testing and post-construction CCTV on the sanitary sewer pipe, manholes, laterals and appurtenances. Payment under this item shall also include removal and disposal of existing sanitary sewer lines, where indicated as such on the drawings. No separate payment will be made for removal and disposal of existing sanitary sewer lines.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel, lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

No additional payment shall be made for excavation in excess of the allowable trench width as defined by PWC standards.

6. Transport Owner Furnished Pipe from Owner's Storage Yard to Contractor's Staging Yard

This lump sum item includes all equipment, transportation, equipment and materials to relocate and transport the "Owner furnished" 24-inch SDR 26 PVC from the Owner's storage yard to the Contractor's staging yard. Payment shall be made after all furnished pipe is acceptably removed, delivered to and safely secured at Contractor's staging yard. No partial payments will be made in the event Contractor performs this task over a duration exceeding 30 days.

7. Furnish and Install Polyvinyl Chloride (PVC) SDR-26 Sewer Pipe (Open Trench)

This item shall be measured by actual linear feet of gravity sanitary sewer pipe installed, complete, in place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with manhole structures. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the gravity sanitary sewer pipe as indicated on the plans and in accordance with PWC standards, at each depth class as listed in the Bid with depth measured vertically from pipe invert to original grade. The unit price shall not include sanitary sewer pipe installed by bore and jack or for aerial crossings.

Work shall include all costs for clearing and grubbing, excavation (including exploratory excavation), bracing, shoring, sheeting, backfill, compaction, cutting and removal of pavement, and protection and adjustment of aboveground and underground utilities and service connections. Work shall also include furnishing and installation of fittings, coatings, detection wire, bedding material, and pipe at the specified line and grade. Work shall include replacement of fencing, support of nearby structures, and shoring where necessary. Work shall also include de-watering, CCTV, coordination with the PWC Project Coordinator, testing, inspection, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work. Payment under this line item shall include all costs necessary to perform the required testing and post-construction CCTV on the sanitary sewer pipe, manholes, laterals and appurtenances. Payment under this item shall also include removal and disposal of existing sanitary sewer lines, where indicated as such on the drawings. No separate payment will be made for removal and disposal of existing sanitary sewer lines.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel, lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

No additional payment shall be made for excavation in excess of the allowable trench width as defined by PWC standards.

8. Furnish and Install C900 PVC DR 18 Sewer Pipe (Open Trench)

This item shall be measured by actual linear feet of gravity sanitary sewer pipe installed, complete, in place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with manhole structures. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the gravity sanitary sewer pipe as indicated on the plans and in accordance with PWC standards, at each depth class as listed in the Bid with depth measured vertically from pipe invert to original grade. The unit price shall not include sanitary sewer pipe installed by bore and jack or for aerial crossings.

Work shall include all costs for clearing and grubbing, excavation (including exploratory excavation), bracing, shoring, sheeting, backfill, compaction, cutting and removal of pavement, and protection and adjustment of aboveground and underground utilities and service connections. Work shall also include furnishing and installation of fittings, coatings, detection wire, bedding material, and pipe at the specified line and grade. Work shall include replacement of fencing, support of

nearby structures, and shoring where necessary. Work shall also include de-watering, CCTV, coordination with the PWC Project Coordinator, testing, inspection, removal and disposal of excess unsuitable material off site, and all labor, materials, equipment, and incidentals necessary to complete the work. Payment under this line item shall include all costs necessary to perform the required testing and post-construction CCTV on the sanitary sewer pipe, manholes, laterals and appurtenances.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel, lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

No additional payment shall be made for excavation in excess of the allowable trench width as defined by PWC standards.

9. Furnish and Install Epoxy-Lined Class 250 Ductile Iron Sewer Pipe (Open Trench)

This item shall be measured by actual linear feet of gravity sanitary sewer pipe installed, complete, in place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with manhole structures. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the gravity sanitary sewer pipe as indicated on the plans and in accordance with PWC standards, at each depth class as listed in the Bid with depth measured vertically from pipe invert to original grade. The unit price shall not include sanitary sewer pipe installed by bore and jack or for aerial crossings.

Work shall include all costs for clearing and grubbing, excavation (including exploratory excavation), bracing, shoring, sheeting, backfill, compaction, cutting and removal of pavement, and protection and adjustment of aboveground and underground utilities and service connections. Work shall also include furnishing and installation of fittings, coatings, detection wire, bedding material, and pipe at the specified line and grade. Work shall include replacement of fencing, support of nearby structures, and shoring where necessary. Work shall also include de-watering, CCTV, coordination with the PWC Project Coordinator, testing, inspection, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work. Payment under this line item shall include all costs necessary to perform the required testing and post-construction CCTV on the sanitary sewer pipe, manholes, laterals and appurtenances.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and

maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel, lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

No additional payment shall be made for excavation in excess of the allowable trench width as defined by PWC standards. The interior lining of the ductile iron sewer main shall be in accordance with PWC Standard Specifications 09802 Ceramic Epoxy Coating or an equal approved by the PWC Project Engineer.

10. Furnish and Install Restrained Joint Epoxy-Lined Class 250 Ductile Iron Sewer Pipe (Open Trench)

This item shall be measured by actual linear feet of gravity sanitary sewer pipe installed, complete, in place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with manhole structures. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the gravity sanitary sewer pipe as indicated on the plans and in accordance with PWC standards, at each depth class as listed in the Bid with depth measured vertically from pipe invert to original grade. The unit price shall not include sanitary sewer pipe installed by bore and jack or for aerial crossings. Sewer main installed through bore pit to manhole and/or to edge of pit after bore is made shall be paid for as pipe installed in its respective depth class. Sewer main installed outside of casing pipe not included in a bore and jack shall be paid for as pipe installed in its respective depth class.

Work shall include all costs for clearing and grubbing, excavation (including exploratory excavation), bracing, shoring, sheeting, backfill, compaction, cutting and removal of pavement, and protection and adjustment of aboveground and underground utilities and service connections. Work shall also include furnishing and installation of fittings, coatings, detection wire, bedding material, concrete anchors (where specified) and pipe at the specified line and grade. Work shall include replacement of fencing, support of nearby structures, and shoring where necessary. Work shall also include de-watering, CCTV, coordination with the PWC Project Coordinator, testing, inspection, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work. Payment under this line item shall include all costs necessary to perform the required testing and post-construction CCTV on the sanitary sewer pipe, manholes, laterals and appurtenances.

This item shall also include all required temporary bypass pumping, including pump mobilization and demobilization, manhole plugs, bypass lines, hydrostatic testing of the bypass system, installation and maintenance of all necessary containment items, coordination with residents/businesses, clean-up of the bypass lines, continuous monitoring of the bypass system, appropriate air release valves, fuel,

lubricants, labor, materials, equipment, and all other incidentals necessary to ensure that the pumping operation provides uninterrupted sanitary sewer service to customers is in compliance with North Carolina regulations and PWC Specifications.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

No additional payment shall be made for excavation in excess of the allowable trench width as defined by PWC standards. The interior lining of the ductile iron sewer main shall be in accordance with PWC Standard Specifications 09802 Ceramic Epoxy Coating or an equal approved by the PWC Project Engineer.

11. Furnish and Install Steel Encasement Pipe installed by Guaranteed Encased Trenchless Installation with Restrained Joint Epoxy-Lined Class 250 DIP Sanitary Sewer Carrier Pipe

This item shall be measured by actual linear feet, completed and in place, of the encasement pipe housing the carrier pipe, installed, complete, in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to complete the steel casing installation by trenchless installation (guaranteed) as shown in the Contract Documents. The Contractor shall furnish all materials and equipment necessary to complete the trenchless installation. Work shall include all costs for excavation, trenching, shoring, bracing, and sheeting calculations provided by an engineer licensed by the state of North Carolina, de-watering as necessary, repairs to existing utilities damaged as a result of the work being performed, clearing and grubbing, cutting and removal of pavement, removal and disposal of excess material off site, backfill, compaction, bore and jack equipment and all associated materials, encasement pipe, spacers, end seals, carrier pipe, restraints, coatings, fittings, connections to existing or new mains, and all labor, materials, equipment, locating, marking the locations of existing utilities prior to the trenchless operation, tools, and incidentals necessary to complete the work. This item shall also include submittal defining selected methods and equipment that will be utilized to complete trenchless installation, all surveying costs associated for setting up selected trenchless equipment, verifying alignment and grade conforms to elevations and design on the Drawings, and verifying encasement installation is acceptable to receive installation of the carrier pipe.

A separate additional payment shall be made for rock removal over and above the cost of excavating non-rock material. Change orders caused by subsurface conditions that could have been reasonably discovered as part of an investigation may not be eligible for funding and shall not be paid.

12. Connect to Existing Sanitary Sewer Pipe

This item shall be measured by actual count of new pipeline connections to existing sanitary sewer pipelines, complete and in place. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to locate and excavate an existing sanitary sewer pipeline, cut the existing pipeline and install required fittings, couplings and incidentals required for a new, water-tight connection between new and existing sanitary sewer pipelines.as indicated on the plans and in accordance with PWC Standards. Work shall include temporary bypass pumping, all materials, testing, and all equipment, tools, labor, and incidentals necessary to complete the work.

All work shall be accomplished in accordance with PWC Standard Specifications 02730 Sanitary Sewer Systems.

13. PVC Sewer Lateral Installation

Installation of PVC sewer laterals shall be measured by actual count, complete, in place, and payment will be made at the applicable unit price bid as listed in the Bid Form. Payment under this item shall include all costs necessary to furnish and install a PVC sanitary sewer lateral in accordance with PWC standards. Work shall include all costs for excavation, backfill, compaction, cutting of pavement, removal and disposal of excess unsuitable material off-site, proper disposal of waste, dewatering, marking the location of the lateral on the curb or edge of pavement, installation of a cleanout, all necessary fittings, stone bedding, installation of the lateral at the specified line and grade, and all labor, materials, equipment, and incidentals necessary to complete the work. All laterals installed must have passed the detailed compaction requirements in order to be considered for payment.

14. Reconnect Existing Sanitary Sewer Service

This item shall be measured by actual count and by size of sewer laterals installed as replacements. Payment shall be made at the applicable unit price listed in the Bid Form. The unit price for this item shall include all costs necessary to install a new sanitary sewer lateral and abandon the existing lateral as indicated on the plans and in accordance with PWC standards. The unit price shall include all costs for excavation, backfill, compaction, cutting of pavement, removal and disposal of excess unsuitable material off-site, proper disposal of waste, dewatering, temporary connection to temporary manhole to maintain sewer service to customer, bypass pumping and/or pumping and hauling out of the temporary manhole, installation of the new laterals at the specified line and grade, connecting to the relocated main or manhole as indicated on the Contract Drawings, installation of cleanouts, connecting the new lateral to the customer side, all necessary fittings, coatings and linings, marking the location of the lateral on the curb or edge of pavement, cutting and capping the existing lateral prior to abandonment of the sewer main, and all labor, materials, equipment, and incidentals necessary to complete the work. All newly installed laterals must have passed the testing requirements in order to be considered for payment.

SANITARY SEWER MANHOLES

15. Furnish and Install Precast Concrete Manhole

This item shall be measured by actual count, complete and in place. Payment will be made at the applicable unit price for size, depth, and type as listed in the Bid Form. For Payment purposes, the manhole depth is defined as the difference between the manhole rim elevation and lowest invert elevation.

Payment under this item shall include all costs necessary to install the specified manholes as indicated on the plans and in accordance with PWC Standards. Work shall include cutting and removal of pavement, removal and disposal of excess unsuitable material off site, excavation, backfill, de-watering, compaction, stone base, sealants, grout, boots, installation of PWC-issued marker, ring and cover as specified on the Contract Drawings, anti-microbial admixture, testing, and all equipment, tools, labor, and incidentals necessary to complete the work. Payment under this item includes providing a booted connection and plugged pipe stub where shown on the Drawings to accommodate future extension. Payment under this item shall also include removal and disposal of existing sanitary sewer manholes, where indicated as such on the drawings. No separate payment will be made for removal and disposal of existing sanitary sewer manholes.

Installation of the precast-concrete manholes shall be accomplished in accordance with PWC Standard Specifications 02730 Sanitary Sewer Systems.

16. Furnish and Install Inside Drop

This item shall be measured by actual linear footage of inside drop vertical pipe, complete and in place. Payment will be made at the applicable unit price for size as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the inside drop as indicated on the plans and in accordance with PWC Standards. Work shall include boots, pipe, fittings, transition couplings (where required), supports, incidentals and all other items as specified on the Contract Drawings, as well as all equipment, tools, labor, and incidentals necessary to complete the work.

Installation shall be accomplished in accordance with PWC Standard Specifications 02730 Sanitary Sewer Systems.

17. Furnish and Install Standard Manhole Vents

This item shall be measured by actual count, complete and in place. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the specified manhole vents as indicated on the plans and in accordance with PWC Standards. Work shall include materials, coatings, testing, and all equipment, tools, labor, and incidentals necessary to complete the work.

Installation shall be accomplished in accordance with PWC Standard Specifications 02730 Sanitary Sewer Systems.

18. Connect to Existing Manhole

This item shall be measured by actual count of new pipeline connections to an existing manhole, complete and in place. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to excavate an existing manhole, core a hole, install a pipe-to-manhole connector and fit a new, water-tight line into the existing manhole as indicated on the plans and in accordance with PWC Standards. Work shall include temporary bypass

pumping, installation of PWC-issued marker, materials, testing, and all equipment, tools, labor, and incidentals necessary to complete the work.

All work shall be accomplished in accordance with PWC Standard Specifications 02730 Sanitary Sewer Systems.

19. Furnish and Install Manhole Insert Odor Control

This item shall be measured by actual count, complete and in place. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the specified manhole insert odor control as indicated on the plans and in accordance with PWC Standards. Work shall include materials, supports, testing, and all equipment, tools, labor, and incidentals necessary to complete the work.

Installation shall be accomplished in accordance with manufacturer requirements and Section C-01000 Special Conditions, Item 50.

20. Furnish and Install Anti-Microbial Admixture, Cementitious Base Coating and Polymeric Lining

This item shall be measured by actual vertical feet of coatings, complete and in place. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to install the admixture and coatings for the manholes as indicated on the plans and in accordance with PWC Standards. Work shall include materials, testing, and all equipment, tools, labor, and incidentals necessary to complete the work. Installation shall be accomplished in accordance with manufacturer requirements and Specification 0901 and 09802.

EROSION AND SEDIMENTATION CONTROL

Prospective bidders are advised, that erosion and sedimentation control will be strictly enforced, and any failure to conform to required standards is considered a right of precedent to PWC to deny payment. Additional measures required by the North Carolina Department of Environmental Quality (NCDEQ) shall not be cause for change in the unit and or lump sum price bid. Bidders shall make themselves aware of all NCDEQ regulations and requirements. The Contractor shall be responsible for all fines levied due to improper erosion and sediment control measures to include all costs incurred by the City of Fayetteville and/or Fayetteville Public Works Commission necessary to bring a non-conforming site into compliance.

21. Furnish and Install Erosion and Sedimentation Control Devices

A. The lump sum prices bid under the applicable PARTs in the Bid Form bid for erosion and sedimentation control shall include all costs for furnishing, erecting, maintaining and removing silt fence, temporary sedimentation control devices, rip-rap, rock check dams, temporary seeding, filter fabric, integral straw, culled wood matting, inlet protection, temporary construction entrances and any other erosion control devices shown or as may be required by the appropriate regulatory agencies throughout the project site, throughout the project duration. No additional payment will be made for removal of soil and debris from

drainage structures, features, or reconditioning grading that is part of the normal maintenance activities associated with the approved erosion control plan. No additional payment shall be made for any other work due to inadequate or improperly maintained measures.

B. Prospective bidders are advised, that erosion and sedimentation control will be strictly enforced, and any failure to conform to required standards is considered a right precedent to the Owner to deny payment.

C. The lump sum price bid shall include all costs necessary for the Contractor to comply with the requirements of the NPDES permit that is associated with the approved erosion control permit. Such activities include, but are not limited to: installation and maintenance of rain gauges, completing the required inspection reports, posting the permit and reports on the project, and furnishing copies of the inspections reports to the Owner.

D. Payment under the lump sum prices bid for each PART shall be made on a monthly basis as indicated in the Contractor's schedule for the substantial completion of all work under this Contract. In no case, shall the monthly payment exceed ten (10) percent of the lump sum prices bid without the approval of the Owner.

E. Lump sump price shall include the following estimated quantities of devices for Parts A and B:

a) 8,485 LF of temporary silt fence
b) 1,000 LF of temporary high hazard silt fence
c) 11,700 LF of temporary combination silt/tree protection fence
d) 6,815 LF of temporary tree protection fence
e) 53 each of temporary silt fence stone outlet
f) 29 each of temporary curb inlet protection devices
g) 30 SY of Class I rip rap (18" minimum depth)
h) 6 each of temporary construction entrances

22. Furnish and Install Anti-Seepage Collars

This item shall be measured by actual count of anti-seepage collars per type and size placed. Payment will be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary, including materials, testing, and all equipment, tools, labor, and incidentals necessary to complete the work.

23. Convert Temporary Construction Entrance to Permanent Access

This item shall be measured by count of each temporary construction entrance converted to a permanent access, and shall include all costs for furnishing, grading, permitting, installing, traffic control, and other work, as may be required by the appropriate regulatory agencies throughout the project site. Installation shall be accomplished in accordance with applicable PWC and NCDOT Standards. This item includes removal and disposal of temporary stone, subgrade preparation, sub-base preparation and installation and surface course of asphalt to provide a paved driveway apron and stub in accordance with NCDOT requirements.

24. Furnish and Install Temporary Stream Crossing

This item shall be measured by each stream crossing. Payment shall be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to protect the stream as indicated on the plans and in accordance with PWC standards.

Work shall include all costs for maintenance, inspection, bypass pumping, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work.

25. Furnish and Install Temporary Wetland Crossing

This item shall be measured by each wetland crossing. Payment shall be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary protect the wetland as indicated on the plans and in accordance with PWC standards.

Work shall include all costs for maintenance, inspection, removal and disposal of excess material off site, and all labor, materials, equipment, and incidentals necessary to complete the work.

26. Sod Grass Installation

This item shall be measured by square feet of sod complete and in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Work shall include all costs to prepare the soil, anchoring, placing sod, providing topsoil as necessary, grading, raking, pest and disease control, soil amendments, fertilizing, maintaining, removal and replacement of dying sod, watering, re-sodding if required, tack, and all labor, materials, tools, equipment, and incidentals necessary to complete the work. No payment will be made for placing sod in areas outside of easements or rights-of-way disturbed or otherwise damaged by the Contractor.

Once construction is completed, the Contractor shall be responsible for fine grading all exposed areas. All exposed areas of the project are to be placed with sod to insure against erosion, in accordance with the Soil Erosion and Sedimentation Control requirements.

Stripping of topsoil will not be measured and paid for as a separate bid item. All work shall be included for payment under the applicable items listed in the Bid Form. Work shall include stripping, stockpiling, spreading, leveling, supplemental topsoil, filling, grading and compaction of suitable topsoil along right-of-way and easements.

All sod shall be installed in accordance with PWC Standard Specification 02931 – Sod.

27. Permanent Seeding

This item shall be measured by square feet and type of permanent seeding complete and in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Work shall include all costs to prepare the soil, providing topsoil as necessary, grading, raking, pest and disease control, soil amendments, fertilizing, seeding, mulching, maintaining, removal and replacement of dying vegetated areas, watering, reseeding if required, tack, and all labor, materials,

tools, equipment, and incidentals necessary to complete the work. Once construction is completed, the Contractor shall be responsible for fine grading all exposed areas. All exposed areas of the project are to be placed with permanent seeding, unless sod is required, to ensure against erosion, in accordance with the Soil Erosion and Sedimentation Control requirements.

Stripping of topsoil will not be measured and paid for as a separate bid item. All work shall be included for payment under the applicable items listed in the Bid Form. Work shall include stripping, stockpiling, spreading, leveling, supplemental topsoil, filling, grading and compaction of suitable topsoil along right-of-way and easements.

All seeding shall be installed in accordance with PWC Standard Specification 02933 – Seeding and 02934 – Seeding (Wetlands) as applicable

INCIDENTALS, DEMOLITION AND RESTORATION

28. Asphalt Pavement Patch-Non NCDOT (City of Fayetteville and Town of Hope Mills) (No Overage Allowed)

Payment for placing a minimum of two (2) inches of Asphalt Pavement Surface Course (SF9.5A) and eight (8 inches of Aggregate Base Course (ABC), shall be made at the unit price bid per square yard completed and accepted as listed in the Bid Form. Installation of the permanent pavement patch shall be completed in accordance with these Contract Documents. Measurement shall be based on the number of square yards. The square yards will be calculated using the maximum trench widths.

Maximum payment widths for trenches have been established as indicated below. Payment widths shown include a minimum cutback of six (6) inches on each side of the trench prior to placing pavement patch. Any pavement removed or damaged beyond the limits specified, shall be replaced by the Contractor at his own cost unless directed otherwise by the Project Engineer. No payment for overage beyond the quantity shown in the Bid Form will be made.

Maximum Pay Widths for Permanent Pavement Patch

Storm Drainage 6’ (for pipe 24” in diameter and less)

Storm Drainage 8’ (for pipe 30” up to 42” in diameter)

Storm Drainage 10’ (for pipe 48” up to 54” in diameter)

Storm Drainage 12’ (for pipe greater than 54”)

Sanitary Sewer 10’ (0’ to 10’ depth, measured to invert of pipe)

Sanitary Sewer 12’ (greater than 10’ depth, measured to invert of pipe)

Sewer Laterals 6’

Water Main 4’

Water Services 4’

Payment for furnishing and placing permanent asphalt pavement patch shall include re-cutting pavement to straight uniform widths parallel and perpendicular to the road with no jagged edges, removal and disposal of asphalt offsite, re-compaction of pavement subgrade, placement and compaction of ten (10 inches of ABC, maintaining ABC stone at pavement grade until removal of upper two (2) inches for paving, installation and maintenance of transitions to accommodate road travel, adjusting structures as required, tack coat, placing and compacting of asphalt material, cleanup, and all costs for labor, materials, tools, equipment, and incidentals necessary to complete the work.

29. Reconstruct NCDOT Maintained Residential Street (No Overage Allowed)

Payment for reconstructing designated streets on the plans from edge of pavement (EOP) to EOP or back of curb (BOC) to BOC by removing all remaining pavement following utility trench activities, removing existing subgrade, preparing subgrade before placement of 8" ABC stone base, compacting stone base, placing and compacting a minimum of two (2) inches of Asphalt Pavement Surface Course (SF9.5B), replacing all pavement striping with thermoplastic markings, and replacing all curb with similar curb and curb base. This item shall be made at the unit price bid per square yard completed and accepted as listed in the Bid Form. Installation of the residential street reconstruction shall be completed in accordance with these Contract Documents, the current NCDOT Standards and Specifications, and details shown on the Drawings. Measurement shall be based on the number of square yards. The square yards will be calculated using the actual street widths.

30. Mill and Overlay

This item shall be measured by square yards of surface milled and overlaid, complete and in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Work shall include all incidentals as required for a complete mill and overlay in accordance with the contract documents to the extents as indicated on the plans. Mill and overlay shall be tied to existing asphalt as indicated on the plans.

31. Gravel Driveway Repair

This item shall be measured by square yards of gravel complete and in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Work shall include all costs to remove gravel, excavate as necessary, install backfill and bedding, install new gravel, perform compaction as required, and return the surface to its original or better condition.

32. Dirt Road Repair

This item shall be measured by square yards of dirt drive complete and in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Work shall include all costs to remove provide backfill, perform compaction as required, and return the surface to its original or better condition.

33. Removal and Replacement of Concrete

This item shall be measured by quantity of concrete complete and in place (curb and gutter per lineal foot and concrete flatwork per square yards). Payment shall be made at the applicable quantity and unit price as listed in the Bid Form.

Work shall include all costs to remove existing surface, excavate as necessary, install new concrete, and return the surface to its original or better condition.

34. Undercut Pipe Trench and Replacement with No. 57 or No. 67 Stone for Pipe Foundation

This item shall be measured by cubic yards along the centerline of the trench times the undercut depth below the pipe bedding as shown in the Contract Documents. Measurement shall be based on the actual quantities removed but not exceeding the maximum specified trench dimensions. Payment shall not be made for quantities that have not been field verified.

This work includes complete removal and disposal of unstable soil including, but not limited to, excavating, loading, hauling, properly disposing of excavated material, and providing stone for backfill, including wrapping of stone geotextile fabric. Providing stone material for backfilling shall include, but not be limited to, material, loading, hauling, placing and compacting.

35. Removal of Unsuitable Material Excavation and Backfill with Select Material

This item shall be measured by cubic yards of unsuitable material excavated below the bedding limit line of four (4) inches below the pipe as authorized by the PWC Project Coordinator. Measurement for undercut below pipes shall be based on the internal diameter of the pipe plus two (2) feet, multiplied by the authorized additional depth required for proper support of the pipeline. Measurement for undercut below structures shall be based on the external diameter/dimension of the structure plus two (2) feet, multiplied by the authorized depth required for proper support of the structure. Measurement for unsuitable material within the pipe trench, which is located within a roadway shall be based on the actual trench width, not exceeding the maximum payment width for asphalt replacement. Payment shall be made at the applicable unit price as listed in the Bid Form.

Payment shall include the costs for all labor, tools, materials and equipment including but not limited to the removal and disposal of unsuitable soil, approved bedding material and all other incidentals necessary to complete the work. No payment for undercut will be made for over excavation by error or where proper dewatering methods are not in place for trench and or excavation stabilization.

This item shall be measured by cubic yard, and shall be 75% of the volume indicated on the submitted truck tickets. The PWC reserves the right to verify the actual amount of material in place. Payment shall be made at the applicable unit price as listed in the Bid Form.

Payment under this item shall include all costs necessary to furnish and install select material necessary to provide proper suitable backfill material compacted and in place as measured. Work shall include all costs to acquire, place, and compact select backfill material, removal and proper disposal of unusable material, and all labor, materials, equipment, and incidentals necessary to complete the work. The PWC Project Coordinator shall approve the use of select material within the limits of this project.

Borrow excavation material shall be supplied by the Contractor from approved borrow areas located off-site. Materials utilized "on-site" within the Project limits or as defined, as the "free haul limit" will not be considered for payment as borrow excavation.

Disposal of unsuitable and/or suitable excavated material will not be paid for as a separate bid item

36. Rock Excavation and Replacement with Select Backfill

This item shall be measured by cubic yard as follows:

1. Pipe: Measure along the centerline of the trench, times the depth from the top of rock profile to the specified depth below the pipe, times the pipe bell OD plus four (4) feet.

2. Structure: Measure two (2) feet beyond the outside wall of the structure (excluding extended base) and to a depth of one foot greater than the bottom of the structure.

3. Tunneling and Boring Launch/Receive Pits: Maximum pit dimensions of 40' x 20' or as noted on the plans.

4. General: Take measurements in the presence of the Engineer or PWC Project Coordinator. Maintain daily log sheets of measured quantities. Log sheets must be signed by the PWC Project Coordinator or Engineer and submitted with payment request. Payment shall not be made for quantities that have not been field verified by the PWC Project Coordinator or Engineer.

Payment for this item shall include all costs necessary to complete removal and disposal of excavated rock material including, but not limited to, drilling, excavating, loading, hauling, and properly disposing of excavated material. Providing specified material for backfilling shall include, but not be limited to, material, bedding material, loading, hauling, placing and compacting.

37. Maintenance Stone (No Overage Allowed)

Payment for maintenance stone (#57) authorized by the Project Coordinator shall be made at the unit price bid per square yard. Payment shall include all costs for labor, tools, materials, equipment, compaction, maintenance, and the removal and disposal of maintenance stone in each area.

To be considered for payment, maintenance stone shall be at a minimum depth of four (4) inches and a minimum length of fifty feet.

38. Removal and Replacement Drainage Pipe

Payment for this item shall be measured and paid for at the unit price bid per linear foot as indicated in the bid schedule. Payment per linear foot of storm drainage pipe will be made under the applicable unit price for each size of pipe installed, and type as indicated in the Bid Form. Payment shall include the cost for excavation, removal of indicated existing pipe, bedding stone, shoring, disposal of existing pipe, removal and disposal of excess unsuitable material off site, installation of proposed drainage pipe, installation of concrete collars, grading, backfilling,

dewatering, compaction and all other work required for a complete installation.

39. Hydrostatic Pressure Testing of Sewer Pipe at Aerial Pipes, Pipes Near Private Wells and Pipes Crossing Wetlands

This item shall be measured by the lineal feet of gravity sewer hydrostatically pressure tested to the requirements defined in Section 01000 Special Conditions, Special Condition 46-Testing Aerial Pipes, Pipes Near Private Wells, and Pipes Crossing Wetlands. No separate payment for the 20-feet of minimum restrained joint pipe will be made or any alternative method the Contractor proposes and authorized PWC. It shall be incidental to the cost of open cutting the sewer and included as part of all pipe installation payment items.

40. Remove Existing Sanitary Sewer Manhole

This item shall be measured by each for removal and disposal of each existing manhole as designated on the Drawings. Payment shall include the cost for excavation, removal of indicated existing manhole, removal of bedding stone, shoring, disposal of existing manhole, removal and disposal of excess unsuitable material off site, compaction, backfill, bypass pumping and all labor and equipment to acceptably remove existing sewer manhole. Extending existing sewer from the existing manhole to be removed and connecting it to new manhole shall be incidental to this item. Estimated linear footage of sewer is 19.6 feet.

41. Remove and Replace Existing Drainage Structures

This item shall be measured by each for removal and disposal and replacement of each existing drainage structure as designated on the Drawings. Payment shall include the cost for excavation, removal and replacement of indicated existing drainage structure, removal and replacement of bedding stone, shoring, disposal of existing structure, removal and disposal of excess unsuitable material off site, compaction, backfill, bypass pumping and all labor and equipment to acceptably remove and replace existing drainage structure. For the removal and replacement of the dual curb inlets, this item shall include the removal and replacement of the connecting pipe, curb and gutter, grates, hoods, etc.

WATER MAIN INSTALLATION

42. Remove and Replace PVC Water Main

This item shall be measured by actual linear feet of existing PVC water main removed and replaced, complete, in\ place, measured horizontally along the centerline of the top of the pipe. Measurement for payment shall be made along the pipe centerline to the point of intersection with reconnection to existing main and to terminus and/or end of main blow off assembly. Payment shall be made at the applicable unit price for each pipe diameter as listed in the Bid Form.

Installation of the PVC water main shall be accomplished in accordance with North Carolina regulations and PWC standards and specifications. Work shall include all costs for excavation, removal and disposal of existing water main, backfill, thrust blocking as required, compaction, fittings, tracing wire, cutting and removal of pavement, removal and disposal of excess unsuitable material off site, installation of the pipe at the specified line and grade, bedding material, and all labor, materials, equipment, and incidentals necessary to complete the work. The Contractor shall be

responsible for completing the installation, all required compaction testing, proper alignment of the installed main, and all other items related to proper installation. No payment for installation of water main shall be made until all required compaction testing has been satisfactorily completed.

43. 2" Cut In Valve

Installation of 2" cut in valves on 2" existing mains shall be measured by actual count, complete, in place, and payment will be made at the applicable unit price bid as listed in the Bid Form. Payment under this item shall include all costs necessary to install the specified valve and valve box on the existing water main under a service interruption, as indicated on the plans and in accordance with PWC standards and specifications and policies and requirements for service interruption. All 2" valves shall be installed in accordance with PWC standard details. Work shall include cutting and removal of pavement, removal and disposal of excess unsuitable material off site, excavation, backfill, compaction, installation, cutting and disposal of the existing water main, installing and restraining the valve, installing valve boxes, fittings, concrete protection rings, concrete collars, tracing wire, and all equipment, tools, labor, and incidentals necessary to complete the work. Location of cut in valve shall be coordinated between Contractor and PWC Project Coordinator and shall be arranged to isolate the portions of work in conflict with the existing water main and to minimize service outages that could occur because of the work.

44. Remove and Replace Blow Off Assembly

Removal and replacement of blow-offs shall be measured by actual count, complete, in place, and payment will be made at the applicable unit price bid and size as listed in the Bid Form. Payment under this item shall include all necessary costs to remove and replace a blow-off at the end of water mains, in accordance with PWC standards. The Contractor shall remove and replace a blow-off assembly at the end of the water mains, as indicated on the drawings and which are in conflict with the sewer work. Work shall include all costs for excavation, removal and replacement of blow off assembly, valve boxes, meter boxes, tracing wire, backfill, compaction, fittings, thrust blocks, saddles, concrete protector rings, concrete collar, and all equipment, tools, labor, and incidentals necessary to complete the work.

45. Replacement of Existing 3/4-inch Water Service

Replacement of existing water services shall be measured by actual count, complete, in place, and payment will be made at the applicable unit price bid as listed in the Bid Form. The Contractor shall replace the existing water services, utilizing ¾" CTS 200 pipe for doubled services or ¾" P.E. pipe, as indicated on the plans. Installation of the services shall be in accordance with AQUA standards. The meter boxes shall be located 18-inches inside the right-of-way, in accordance with AQUA standards. All connections to the customer side of the meter shall be completed by the Contractor. Payment under this item shall include all costs necessary to install the new ¾" CTS 200 pipe for doubled services or ¾" P.E. pipe, as indicated on the plans. Work shall include cutting and removal of pavement, removal and disposal of excess unsuitable material off site, excavation, backfill, compaction, installation, if necessary boring the lateral under the road, furnishing and installing new meter boxes, corporations, saddles, lock valves, tailpiece, fittings, tapping the new or existing water main, connecting the new service to the Customer's side utilizing brass fittings, and all equipment, tools, labor, and incidentals necessary to complete the work. No payment for installation of water services shall be made until all required compaction testing has been satisfactorily completed.

Payment for this item shall be measured and paid for at the unit price bid per linear foot as indicated in the bid schedule.

46. Sterilization and Testing

Payment under this line item shall include all costs necessary to perform the required testing on the water mains, laterals and appurtenances. Payment shall be made at the applicable unit price per lineal foot as listed in the Bid Form.

Work shall include all costs for furnishing test equipment, installation of temporary taps for testing and/or disinfection, coordination with the Project Coordinator, and all labor, materials, equipment, and incidentals necessary to complete the testing in accordance with PWC standards. All laterals shall be tested. The Contractor shall pressure test and disinfect the new water main, laterals and appurtenances in accordance with PWC standards, prior to placing it into service.

The Contractor shall be responsible for furnishing all necessary equipment to complete the testing and sterilization, coordination with the Project Coordinator, and removal of all unnecessary taps and fittings upon completion of the work. Payment under this line item will not be made until all required tests are successful.

*** END OF SECTION ***

DIVISION 1
GENERAL REQUIREMENTS

01300 – SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This section specifies the means of all submittals. All submittals shall be submitted to the Fayetteville Public Works Commission (PWC). A general summary of the types of submittals and the number of copies required is as follows:

Copies to PWC	Type of Submittal
5	Construction schedule
5	Progress estimates
5	Shop drawings
5	Product samples
5	Certificates of compliance
5	Warranties

B. All submittals shall be provided in accordance with this Section, and as outlined in Section 01000 – Special Conditions. The Contractor shall refer to other Specification Sections within these Contract Documents, to ensure that all submittal requirements are adhered to. No construction shall proceed until all required submittals have been reviewed and approved by the Fayetteville Public Works Commission. Any and all work performed prior to review and acceptance of the submittals by the Fayetteville Public Works Commission shall be at the Contractor's sole risk. Further, failure to comply with the requirements of this section may be considered Breach of Contract, and grounds for termination.

1.02 SUBMITTAL PROCEDURES

A. The Contractor shall transmit each submittal with a form acceptable to the PWC, clearly identifying the project and the Contractor, the enclosed material and other pertinent information specified in other parts of this section. The submittal shall identify variations from the Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

B. The Contractor shall revise and resubmit submittals as required, identifying all changes made since previous submittals. Resubmittals shall be noted as such.

C. The Contractor shall distribute copies of reviewed submittals to concerned parties, with instructions to those parties to promptly report any inability to comply with provisions.

D. The CONTRACTOR shall be solely responsible for the timing of the shop drawing submittal to provide ample time for submittals to be reviewed and revisions to be made and reviewed, especially for long-lead material or equipment.

1.03 CONSTRUCTION SCHEDULE

A. The Contractor shall prepare and submit construction schedules in accordance with Section 01310 – Construction Schedule and these Contract Documents.

1.04 SHOP DRAWINGS

A. General: The Contractor shall submit for review shop drawings for concrete reinforcement, structural details, materials fabricated especially for this Contract, and materials for which such Drawings are specified (as outlined in these Contract Documents) or as specifically requested by the PWC.

B. Shop drawings shall show the principal dimensions, weight, structural and operating features, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the Drawings.

C. When so specified, or if considered by the PWC to be acceptable, the manufacturer's specifications, catalog data, descriptive matter, illustrations, etc. may be submitted for review in place of shop drawings. In such case, the requirements shall be as specified for shop drawings, insofar as applicable.

D. The Contractor shall be responsible for the prompt submittal of all shop drawings so that there shall be no delay to the Work due to the absence of such Drawin The Fayetteville Public Works Commission will review and return the shop drawings within thirty (30) calendar days of receipt of such Drawings. Reviewed shop drawings will be returned to the Contractor by regular mail.

E. Time delays caused by rejection of submittals are not cause for extra charges to the PWC or time extensions.

F. Requirements: All shop drawings shall be submitted to the PWC through the Contractor. The Contractor is responsible for obtaining shop drawings from his subcontractors and returning reviewed Drawings to them. All shop drawings shall be prepared on standard size, 24-inch by 36-inch sheets, or smaller, as approved by the PWC. All Drawings shall be clearly marked with the name of the project, PWC, Contractor, and pay item to which the drawing applies. Drawings shall be suitably numbered and stamped by the Contractor. Each shipment of Drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

G. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted.

H. Product data shall include materials of construction, dimensions, performance characteristics and capacities, etc.

I. Sample Warranties: When warranties are called for, a sample of the warranty shall be submitted with the shop drawings. The sample warranty shall be the same form that will be used for the actual warranty.

J. Work Prior to Review: No material or equipment shall be purchased, fabricated especially for this Contract, or delivered to the project site until the required shop drawings have been submitted, processed and marked either "APPROVED" or "APPROVED AS NOTED". All materials and Work involved in the construction shall be as represented by said Drawings.

K. The Contractor shall not proceed with any portion of the Work for which the design and details are dependent upon the design and details of equipment for which submittal review has not been completed.

L. Contractor's Review: Only submittals which have been checked and corrected should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting shop drawings to the PWC, the Contractor shall check thoroughly all such Drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. Drawings which are correct shall be marked with the date, checker's name and indications of the Contractor's approval, and then shall be submitted to the PWC; other Drawings submitted to the PWC will be returned to the Contractor unreviewed.

M. Contractor's Responsibility: The review of shop drawings will be general and shall not relieve the Contractor of the responsibility for details of design, dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.

N. Contractor's Modifications: For submissions containing departures from the Contract Documents, the Contractor shall include proper explanation in his letter of transmittal. Should the Contractor submit for review equipment that requires modifications to the structures, piping, layout, etc. detailed on the Drawings, he shall also submit for review details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the PWC, shall do all Work necessary to make such modifications.

O. Substitutions: Whenever a particular brand or make of material, equipment, or other item is specified, or is indicated in these contract documents, it is for the purpose of establishing a standard of quality, design, and type desired and to supplement the detailed specifications. Any other brand or make which, in the opinion of the PWC, is equivalent to that specified or indicated may be offered as a substitute subject to the following provisions:

    a. Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature, and performance data together with samples of the materials, where feasible, to enable the PWC to determine if the proposed substitution is equal.
    b. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.
    c. A list of installations (including contact information) where the proposed substitution is equal.
    d. Where the acceptance of a substitution requires revision or redesign of any part of the Work, all such revision and redesign, and all new Drawings and details required therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to review and approval of the PWC.

e. In all cases the PWC shall be the sole judge as to whether a proposed substitution is to be accepted. The Contractor shall abide by the PWC's decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item, or substitute, as specified. No substitute items shall be used in the Work without written acceptance of the PWC. The PWC reserves the right to reject any such proposed changes or substitutions at their sole discretion, and is under no obligation to justify their decision.
f. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

P. Complete Submittals: Each submittal shall be complete in all aspects incorporating all information and data required to evaluate the products' compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor without review.

a. Shop Drawing Distribution: The Contractor shall submit a minimum of five (5) copies of all shop drawings to the PWC for review. Shop drawings will be reviewed, stamped and distributed with the appropriate box checked either "APPROVED", "APPROVED AS NOTED", “NOT APPROVED” or "REVISE AND RESUBMIT". The PWC shall return three (3) copies to the Contractor and retain two (2) copies

If the Contractor requires additional copies of returned shop drawings, he shall include extra Drawings in his original submittal. The PWC will process the Drawings and return them to the Contractor.

1.05 RECORD DRAWINGS

A. The Contractor shall maintain a clean, undamaged set of color prints of contract drawings and shop drawings to be marked up for submittal as record drawings. The set shall be marked with red erasable pencil to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing accurately showing the constructed conditions. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. The Contractor shall give particular attention to concealed elements that would be difficult to measure and record at a later date. The record drawings shall be signed and dated by the Contractor’s project manager.

B. The Contractor shall submit one (1) set of their record drawings to the Fayetteville Public Works Commission upon completion of the project. Final payment will not be made until the record drawings are received.

1.06 PRODUCT SAMPLES

A. Contractor shall furnish for review all product samples as required by the Contract Documents or requested by the PWC to determine compliance with the specifications.

B. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show complete project identification, the nature of the material, trade name of manufacturer and location of the Work where the material represented by the sample will be used.

C. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the PWC and shall bear the Contractor's stamp certifying that they have been so checked. Transportation charges on samples submitted to the PWC shall be prepaid by the Contractor.

D. PWC's review will be for compliance with the Contract Documents, and his comments will be transmitted to the Contractor within 15 business days of receipt.

E. Acceptable samples will establish the standards by which the completed Work will be judged.

1.07 CERTIFICATES OF COMPLIANCE

A. Copies of certificates of compliance and test reports shall be submitted for requested items to the PWC prior to request for payment.

1.08 WARRANTIES

A. Original warranties, called for in the Contract Documents, shall be submitted to the PWC. When warranties are required for an item, the warranty shall be submitted prior to request for payment of that item.

B. When warranties are requested, a sample of the warranty to be provided shall be submitted with, and considered part of, the shop drawings.

C. The Contractor shall warrant to the PWC that all material and labor used in the construction are covered by his warranty for a minimum of a one (1) year period upon approval and acceptance by the PWC (unless otherwise noted in these Contract Documents). The Contractor shall replace or repair defects at no cost to the PWC during the warranty period.

PART 2 -- PRODUCTS - (Not Used)

PART 3 -- EXECUTION - (Not Used)

*** END OF SECTION ***

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DIVISION I
GENERAL REQUIREMENTS

01310 – CONSTRUCTION SCHEDULE

GENERAL

1.01 WORK INCLUDED

A. This section specifies requirements and procedures in preparing and updating construction schedules and reports for planning, coordinating, executing and monitoring the progress of the work. The construction work shall be scheduled to be completed within the specified duration of the Contract.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01000 – Special Conditions
B. Section 00700 – General Conditions
C. Section 01300 – Submittals

1.03 SCHEDULING RESPONSIBILITIES

A. The construction schedule will be used to monitor job progress. The Contractor will be responsible for providing all information concerning the sequencing, logic and durations of planned activities. The Contractor will be responsible for providing monthly update information on logic changes, percent complete, actual start and finish dates and duration changes. The Contractor will be required to prepare and submit schedule updates prior to each of the monthly progress meetings.

B. Assembling the initial schedule in hand drawn or computer-generated (preferred) form is the responsibility of the Contractor.

C. It should be clearly understood that the initial schedule and all update information must be provided by the Contractor and that this information is a representation of the best efforts of the Contractor and his subcontractors as to how they envision the work to be accomplished. Similarly, all progress information to be provided by and through the Contractor must be an accurate representation of his or his subcontractors' or suppliers' actual performance. The schedule shall at all times remain an accurate reflection of the Contractor's actual or projected sequencing of the work. Once accepted, adherence to the schedule shall be obligatory upon the Contractor and his subcontractor for the work under this Contract. The Fayetteville Public Works Commission (PWC) may require the Contractor to revise the schedule if, in the PWC Project Engineer's judgment, the schedule does not accurately reflect the actual extension of the work, or is in violation of any provision of the Contract Documents. The Contractor shall provide the necessary information required to revise the schedule as often as is necessary during the course of performance of the work without additional cost to the PWC.

1.04 PROGRESS OF WORK

A. The work shall be started on the date indicated in the Notice to Proceed and shall be executed with such progress as may be required to prevent delay to other contractors or to the general completion of this project. The Contractor shall at all times, schedule and direct his work so that it provides an orderly progression of the work to completion within the specified Contract Time. The Contractor shall account for traffic control requirements, lead times for ordering materials, access of citizens within the work area, testing, and the requirements for timely restoration.

B. The Contractor agrees that, whenever it becomes apparent from the current monthly schedule update that delays to the planned progress of work have resulted and these delays are through no fault of the PWC and hence, the Contract completion date will not be met, or when so directed by the PWC Project Engineer, he will prepare a recovery schedule outlining steps to recover time and to complete the project on schedule.

   a. The Contractor shall submit for review a written statement of the steps he intends to take, to remove or arrest the delay to the schedule. The Contractor shall promptly provide such level of effort at no additional cost to the Owner. In addition, should schedule delays persist; the Contractor's surety will be asked to attend a schedule update meeting.

C. Failure of the Contractor to comply with the requirements of this section shall subject him to, at the PWC's sole discretion, withholding, in partial or in total, payments otherwise due the Contractor for work due under this Contract. The Contractor agrees that any withholding of monies is not a penalty for noncompliance, but is an assurance for the PWC that funds will be available to implement these requirements should the Contractor fail to do so, since failure of the Contractor to comply with these requirements shall mean that the Contractor failed to execute the work with such diligence as to ensure its completion within the time for completion.

2.01 SCHEDULE REQUIREMENTS

A. The schedule shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The schedule shall show how the start date of a given activity is dependent on the completion date of preceding activities and how its completion restricts the start of succeeding activities. A time scaled precedence format will be followed. The schedule shall indicate the start date, completion date, and duration (in days), of each activity.

B. The Schedule Activities shall be developed into two major groups:

   1. Construction Activities - Construction activities will be physical work activities that describe how the job will be constructed. Work shall include planned restoration and paving.

   2. Post Construction Testing, Start-up, Training and Close-out - Activities for this group shall include all work required satisfying appropriate specification requirements sections and meeting the requirements of final completion. There are at least three (3) mandatory activities: Punch List, Final Walkthrough and Project Completion.

C. The Contractor shall break the work into activity durations of one (1) to twenty (20) business days each, except for non-construction activities (such as procurement of materials and delivery of equipment) and other activities that may require longer durations. To the extent feasible, activities related to a specific physical or geographic area of the project should be grouped on the schedule for ease of understanding and simplification. The selection and number of activities shall be subject to the review of the PWC Project Engineer.

D. Each activity on the schedule shall have indicated for it the following:

1. Construction activities will be divided by easily recognizable division points such as stationing or street names, area of work, etc.

2. A brief description of the activity will be included. If this description is not definitive, a separate listing of each activity and a descriptive narrative may be required.

3. Where the Contractor intends to perform work concurrently, a resource or crew identifier will be assigned to the activity to indicate parallel paths.

4. Established PWC holidays and other non-work days will be excluded from the schedule.

E. Failure to include on the schedule any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within the applicable Contract Time.

F. A schedule which shows a completion of any portion of the construction work prior to the Contract Time dates may be accepted but in no event shall be acceptable as a basis for a claim for any delay against the PWC by the Contractor.

3.01 SCHEDULE IMPLEMENTATION

A. Within ten (10) calendar days after the pre-construction conference and before commencing any work, the Contractor shall submit three (3) prints of a schedule showing the first 45 calendar days of the work. The Contractor will revise and resubmit the 45 day schedule until it is acceptable.

B. Prior to submitting the first application for payment, or within (30) calendar days after the Notice to Proceed (whichever comes first), the Contractor shall submit three (3) copies of their proposed construction schedule for the entire Contract duration. Payment shall not be made until the schedule is submitted and approved by the PWC.

C. The Contractor may submit the schedule on disk in a format wholly compatible with Microsoft Project. Submission of an electronic schedule does not preclude any other of the aforementioned individual activity requirements.

D. If a review of the submitted schedule indicates a work plan that will not complete the work within the Contract time, it shall be the responsibility of the Contractor to revise the schedule as required and resubmit it until it is acceptable. Failure by the Contractor to

submit an acceptable schedule may, at the PWC's sole discretion, be cause for the withholding of any partial payment(s) otherwise due under the Contract.

E. Acceptance of the schedule shall not constitute a representation by the PWC that the work can be completed as shown on the schedule.

3.02 SCHEDULE UPDATES (MONTHLY PROGRESS MEETINGS)

A. The Contractor shall submit a Schedule Update on the Monday prior to the monthly progress meeting, (or as directed by the PWC Project Engineer), to allow the PWC Project Engineer to review the schedule. The schedule shall be up-to-date as of the previous Friday or as directed by the PWC Project Engineer.

B. Actual progress of the previous month shall be recorded and future activities will be reviewed. The duration of activities and their logical connections may be revised as needed. Decisions made at these meetings and agreed to by all parties are binding with the exception that no contractual completion dates will be modified without formal written requests and acceptance as specified in the Contract Documents. The Contractor must provide the following information for each update at a minimum:

1. Actual start and finish dates for all completed activities.

2. Actual start dates for all started but incomplete activities including remaining durations and/or percent completes.

3. Revisions in the logic, critical path or resource assigned to an activity that would affect the anticipated early start of all activities not yet started.

4. Any approved extension of Contract time shall be included in the next monthly updating of the schedule.

C. Provide a Monthly Progress Status Report that provides the following items:

1. Summarized revisions made to the Construction Schedule since the previous submittal.

2. Work anticipated to be started during the next period, including those activities already in progress.

3. Problem areas, anticipated delays, and the impact on the schedule.

4. Corrective action to meet project completion.

5. The effect of changes on schedules of other prime Contractors in adjacent work areas.

D. Failure to provide update information listed above, or failure to attend progress meetings may result in the PWC withholding partial payments.

***END OF SECTION**

DIVISION 1
GENERAL REQUIREMENTS

01400 – QUALITY CONTROL

QUALITY ASSURANCE

Quality: All materials shall be new and correctly designed, and shall conform to the requirements outlined in these Contract Documents to provide the OWNER an operational infrastructure for its intent. They shall be standard first-grade quality produced by expert workmen and be intended for the use for which they are offered. Materials which, in the opinion of the Public Works Commission, are inferior or of a lower grade than indicated, specified, or required will not be acceptable.

Source Limitations: To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, or equipment from a single manufacturer.

Compatibility of Options: If the Contractor cannot obtain all necessary products, materials, and/or equipment from a single manufacturer, the Contractor shall submit compatible products, materials, and/or equipment to the Public Works Commission for review and approval. Once the Public Works Commission has issued approval of the proposed products, materials, and/or equipment, the Contractor shall only utilize that manufacturer's products, materials, and/or equipment, unless otherwise approved in writing by the Public Works Commission.

QUALITY CONTROL

Quality control is the sole responsibility of the Contractor and shall include the activities of his Subcontractors and all suppliers as required.

TESTING SERVICES

The Contractor shall cooperate with the Public Works Commission's Consultant performing required testing and provide equipment, access, or other means required at no additional expense to the Public Works Commission. The Contractor shall be responsible for coordinating testing with the PWC Project Coordinator. The Contractor shall be responsible for all costs incurred by the Public Works Commission's Consultant when scheduled testing cannot be performed.

The Public Works Commission shall employ and pay for the services of an independent laboratory for specified testing as outlined in these Contract Documents, with the following exceptions:

- If Laws and Regulations of any public body having jurisdiction specifically require any part of the Work to be tested, inspected, or approved by an employee or other representative of that public body, the Contractor shall be responsible for arranging and obtaining such inspections and/or approvals. The Contractor shall bear all costs associated with the required testing, inspections, and/or approvals, and shall furnish the Public Works Commission all required documentation that the required testing, inspection, and/or approvals have been obtained.

- If any part of the Work is found to be defective and not in compliance with the Contract Documents, the Contractor shall be responsible for all subsequent testing necessary to prove that

the Work has been brought into compliance. Any necessary testing to ensure compliance shall be directed by the PWC Project Coordinator and/or PWC Project Engineer.

- When scheduled testing by the Public Works Commission's Consultant cannot be performed.

- Arranging and obtaining any required inspections, testing, or approvals required in connection with the Public Works Commission's acceptance of a material supplier, or equipment proposed to be incorporated into the Work, or materials, mix designs, etc. submitted for approval prior to purchase for incorporation into the Work. All inspections, tests, and approvals shall be performed by organizations acceptable to the Public Works Commission.

PRODUCT EVALUATION

Testing shall be accomplished as deemed necessary by the Public Works Commission to ensure that the products conform to the requirements of the Contract Documents.

The work or actions of the testing laboratory shall in no way relieve the Contractor of his obligations under the Contract. The laboratory testing work will include such inspections and testing required by the Contract Documents, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform, accept or approve any of the Contractor's Work.

The Contractor shall allow the Public Works Commission ample time and opportunity for evaluation and testing materials to be used in the Work. The Contractor shall advise the Public Works Commission promptly upon placing orders for materials so that arrangements may be made, if desired, for evaluation before shipment from the place of manufacture. The Contractor shall at all times furnish the Public Works Commission and his representatives, facilities including labor, and allow proper time for evaluation and testing materials, and workmanship. The Contractor must anticipate that possible delays may occur due to the necessity of materials being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Public Works Commission for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various evaluation and tests of structures and materials.

The Public Works Commission will bear the cost of all tests, evaluation, or investigations undertaken by the order of the PWC Project Engineer for the purpose of determining conformance with the Contract Documents if such tests, evaluation, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Public Works Commission as a result of such tests, evaluation, or investigations, the Contractor shall bear the full cost of any additional tests, evaluations and investigations, which are ordered by the Public Works Commission to ascertain subsequent conformance with the Contract Documents.

EVALUATION AT PLACE OF MANUFACTURE

Unless otherwise specified, all products and materials shall be subject to evaluation by the Public Works Commission at the place of manufacture.

The presence of the Public Works Commission at the place of manufacture however, shall not relieve the Contractor of the responsibility for furnishing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Public Works Commission.

SAMPLING AND TESTING

Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered. However, the Public Works Commission reserves the right to use any generally-accepted system of sampling and testing which will ensure that the quality of the workmanship is in full accord with the Contract Documents.

Any waiver by the Public Works Commission of any specific testing or other quality assurance measures shall not be construed as a waiver of any requirements of the Contract Documents. The Public Works Commission may require a guarantee of substantial performance and/or a performance bond to ensure any necessary corrective or remedial Work, should a waiver be granted.

The Public Works Commission reserves the right to make independent investigations and tests. Failure of any portion of the Work to meet any of the requirements of the Contract Documents shall be reasonable cause for the Public Works Commission to require the removal or correction and reconstruction of any such work in accordance with the Contract Documents. In addition to any other evaluation, observation or quality assurance provisions that may be specified, the Public Works Commission shall have the right to independently select, test, and analyze, at their expense, additional test specimens or any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed. The Contractor shall be responsible for all costs of removal, correction, and reconstruction or repair of any such Work that fails to meet the requirements of the Contract Documents.

SITE INVESTIGATION AND CONTROL

The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to their failure to comply with this requirement.

The Contractor shall inspect related and appurtenant Work and shall report in writing to the Public Works Commission any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at their sole cost and expense.

RIGHT OF REJECTION

The Public Works Commission shall have the right, at all times, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work. If the Public Works Commission, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected by the Public Works Commission.

The Contractor shall promptly remove rejected articles or materials from the Work after notification of rejection. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.

WATERTIGHTNESS OF STRUCTURES

It is the intent of these Contract Documents that all Work shall be performed as required by quality construction to ensure proper sealing so that groundwater and/or rainwater will not leak into any repaired collection line, service lateral, or manhole.

The Contractor shall provide at its own expense all labor, material, temporary bulkheads, pumps, water, measuring devices, etc., necessary to perform the required tests.

HYDRAULIC UPLIFT ON STRUCTURES

The Contractor shall be completely responsible for any pipelines or manholes that may become buoyant before the Work is completed and accepted. The Contractor shall take all necessary steps to prevent any structures from becoming buoyant. Damage to any structures due to floating or flooding shall be repaired or replaced at the Contractor's expense.

TIME OF OBSERVATION AND TESTS

Samples and test specimens required under these Contract Documents shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens within the scope of the Contract. Except as otherwise provided in the Contract Documents, the performance and cost of the required tests will be the responsibility of the Public Works Commission. However, the costs of any test which shows unsatisfactory results shall be borne by the Contractor. Whenever the Contractor is ready to backfill, bury, cast in concrete, or otherwise cover any Work under the Contract, the Public Works Commission shall be notified not less than twenty-four hours in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the Public Works Commission a minimum of twenty-four hours in advance of any such inspections shall be cause for the Public Works Commission to order a delay in the Contractor's schedule to allow time for inspections. Any remedial or corrective Work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor.

END OF SECTION

DIVISION 1
GENERAL REQUIREMENTS

01700 – PROJECT CLOSEOUT

GENERAL

The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, temporary structures and facilities, construction signs, tools, scaffolding, materials, supplies and equipment which may have been used in the performance of the work. The Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds. Final acceptance of the Work by the Public Works Commission will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

The Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces.

The Contractor shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering.

The Contractor shall remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.

The Contractor shall maintain cleaning until project, or portion thereof, is accepted by the Public Works Commission.

The Contractor shall:

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
B. Use each type of cleaning material on only those surfaces recommended by the cleaning material manufacturer.
C. Use only materials which will not create hazards to health or property.

CLOSEOUT TIMETABLE

The Contractor shall establish dates for testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the Public Works Commission and their authorized representative's sufficient time to schedule attendance at such activities.

FINAL SUBMITTALS

Before the final acceptance of the project, the Contractor shall submit to the Public Works Commission certain records, certifications, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete or unacceptable items, as determined by the Public Works Commission, shall constitute grounds for withholding final payment to the Contractor. A partial list of such items appears below, but it

shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

A. Written Test results of project components.
B. Written guarantees, where required.
C. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
D. Pre-construction photos (5" x 7").
E. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

PUNCH LISTS

Final cleaning shall be scheduled upon completion of the project.

The Public Works Commission will make their final inspection whenever the Project Coordinator has determined that the work is ready for the inspection. Any work not found acceptable and requiring cleaning, repair and/or replacement will be noted on the "Punch" list. Work that has been inspected and accepted by the Public Works Commission shall be maintained by the Contractor, until final acceptance of the entire project.

Whenever the Contractor has completed the items on the punch list, he shall coordinate an inspection with the PWC Project Coordinator to verify that the punch list items have been satisfactorily completed. This procedure will continue until the entire project is accepted by the Public Works Commission. The "Final Payment" will not be processed until the entire project has been accepted by the Public Works Commission and all of the requirements in this Specification Section have been satisfied and any additional requirements as outlined in Section 01000 – Special Conditions of these Contract Documents.

TOUCH-UP AND REPAIR

The Contractor shall touch-up and repair damage to all existing facilities and surfaces. If in the opinion of the Public Works Commission the touch-up work is not satisfactory, the Contractor shall repeat the item.

MAINTENANCE AND GUARANTEE

The Contractor shall comply with all maintenance and guarantee requirements of the Contract Documents.

Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private Owner or public agency releasing the Public Works Commission from further responsibility in connection with such repair or resurfacing.

END OF SECTION

SECTION D – TECHNICAL SPECIFICATIONS (SEWER/WATER-PART A & PART B)

02111 SITE CLEARING (Utility)

SCOPE

Work described in this section includes clearing and grubbing, site, and protecting adjoining property and trees as indicated on the drawings or as specified herein. The work shall include the complete removal and satisfactory disposal of all growth including trees, stumps, logs and roots; organic material, and other debris or items that interfere with construction operations. The site clearing operations shall be conducted in a manner to insure minimum interference with roads and other adjacent occupied or used facilities.

PROTECTION OF TREES AND VEGETATION

Trees and vegetation to be left standing shall be protected from damage incidental to clearing, grubbing, and construction operations. The protection shall include un-necessary cutting, breaking or skinning of roots; skinning and bruising of bark; smothering of trees by stockpiling construction materials or excavated material within the drip line; excessive foot and vehicular traffic including parking of vehicles within drip line. Trees and vegetation receiving damage shall be repaired or replaced in a manner acceptable to the Engineer.

Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1 -1/2" or more in diameter and shall be trimmed of live branches to such heights and such manner as directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branch. Cuts more than 1-1/2” in diameter shall be painted with an approved tree wound paint.

CLEARING AND GRUBBING

Clearing and grubbing shall be performed within the permanent right-of-ways. In the interest of conserving natural resources and protecting the environment, clearing shall be kept to a minimum within the temporary right-of-ways limits. Where permanent and temporary right-of-ways are offset, the additional temporary area may be used as a "buffer" zone to aid in sediment control where possible. Clearing shall consist of cutting trees, with a stump left not more than two inches (2") above natural ground. Saleable timber shall become the property of the Contractor. Reasonable care shall be taken during construction to avoid damage to vegetation not located in the right-of-ways. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed to improve the appearance. Tree trunks receiving damage shall be treated with approved tree dressing.

Several areas along the main where a temporary easement is indicated on the plans and is located in people's yards, the Contractor shall limit clearing only as absolutely necessary for the sewer installation. Where possible, individual trees shall be worked around and preserved. These particular areas will be noted on the plans.

In the interest of erosion and sediment control, if possible, clearing and grubbing should be staged in ½ mile sections or less. In all cases, the time of disturbance between clearing and grubbing operations and actual sewer line construction should be kept to a minimum, particularly if ditches and temporary roads are utilized for access to the project.

DIVISION 2 SITE WORK

02211 GRADING, UTILITIES

GENERAL

This section covers grading for the roadways and drives including all excavations, formation of embankments, preparation of subgrade for pavements and finishing and dressing of graded earth areas, shoulders, and ditches.

MATERIALS

Topsoil, material obtained from excavation suitable for topsoils, is defined as natural, friable soil, characteristics of representative soils in the vicinity that produce heavy growth of crops, grass, or other vegetation. Topsoil shall be free from roots, stones, and other materials that hinder grading, planting, and maintenance operations, and free from objectionable weed seeds.

Satisfactory soil materials are defined as those in accordance with AASHTO Soil Classification Groups, A-1, A-2-4, A-2-5 and A-3 (or in accordance with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, SC.) as determined by the Engineer. Satisfactory material shall be free from roots, organic matter, trash, debris, frozen material or stones larger than three (3) inches in any dimension.

Unsatisfactory soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, A-7 (or in accordance with ASTM D2487 soil classification groups GC, ML, MH, CL, CH, OL, OH, and PT) as determined by the Engineer.

Materials determined by the Engineer as too wet or too soft to provide a stable subgrade, foundation, or fill will be classified as unsatisfactory regardless of soil classification. The Engineer may require the Contractor to condition the wet and/or soft soils to provide a stable subgrade, foundation, or fill. The Contractor shall recondition the materials at no additional cost to the Owner.

CONSERVATION OF TOPSOIL

Areas designated for operations that contain a blanket of soil, which is more satisfactory for the growth of grass than the embankment material to be placed, shall be stripped to a depth of approximately four (4) to six (6) inches and placed in convenient stockpiles as directed in the field, for later use as a topsoil blanket on the new graded areas specified herein, or as designated. The stripping of material for use as topsoil shall be carefully determined and only the quantity required shall be stripped and stockpiled. Material ordered stockpiled shall be placed in a satisfactory manner to afford drainage. When grading operations permit, instead of stockpiling, the topsoil shall be hauled and spread directly on the areas to receive topsoil.

Topsoil shall be placed on all shoulders, slopes, ditches, and other earth areas graded under this contract, excluding borrow areas, unless otherwise specified on the plans. Topsoil shall be uniformly placed on these areas to a compacted depth of not less than three (3) inches or more than four (4) inches. The material shall be free from clods of soil, matted roots greater than ½ inch in diameter, and any other objectionable material which might hinder subsequent grass and mowing operations. The material shall be placed, leveled, and lightly compacted with at least one pass of a cultipacker, or other approved equipment weighing 100 to 160 pounds per linear foot of roller, to required cross sections, but shall be left one-tenth of a foot below the finished earth grade as specified in the paragraph FINISHED EXCAVATION.

BORROW EXCAVATION (Select Backfill)

Where satisfactory materials are not available in sufficient quantities from the required excavation, approved materials shall be obtained from borrow areas. Borrow excavation material shall be supplied by the Contractor from borrow areas located off-site. The work covered by this section shall consist of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the plans or directed by the Engineer. The borrow material shall be approved by the Engineer and shall not contain roots, root mats, stumps, highly plastic clay or other unsatisfactory materials. The material shall be a soil material which meets requirements of AASHTO Ml 45 for soil classification A-i-a, A-i-b, A-2-A, A-3 acceptable for select backfill. All borrow material shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Borrow excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Excess material removed within the work limits, suitable for borrow excavation, during "Unclassified Excavation" operations shall not be considered or paid for as borrow excavation.

UNDERCUT EXCAVATION

When the Owner determines that the natural soil materials in areas where fill is to be placed, or in the finished graded subgrade roadway cross section, or in areas supporting structures or pipes, are determined to have a poor supporting value, the Engineer may require the Contractor to remove the materials and backfill with approved properly compacted material to the finished graded section. The Contractor shall conduct undercut operations in such a way that the Engineer can take the necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the Engineer, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation and will not be paid for such. All undercut excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition. Undercut excavations suitable for backfill on toes of slopes and other approved areas will not be paid for as borrow excavation.

FINISHED EXCAVATION

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. Surfaces shall be finished not more than 0.15 foot above or below the established grade and approved cross section. In areas where the bulking of soil as a result of grassing operations will tend to retard surface drainage along the edge of pavements, the finished grades shall be left 0.1 foot below grade prior to grassing.

Newly graded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades re-established to the required elevations and slopes. Embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic of other operations and shall be protected and maintained by the Contractor in a satisfactory condition until subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade shall not be permitted. No base course or pavement shall be laid until the subgrade has been checked and approved, and in no case shall base, surfacing, or pavement be placed on a muddy, spongy, or frozen subgrade. All work shall be conducted in accordance with the environmental protection requirements of the contract

02222 EXCAVATION AND BACKFILLING FOR UTILITY SYSTEMS

GENERAL

Work described in this section consists of the excavation, backfill, compaction, and finish grading required to install the utility systems. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Public Works Commission.

RELATED SECTIONS

A. 02730 – Sanitary Sewer Systems
B. Chapter 24 of the City of Fayetteville Ordinance (most recent version)

MATERIALS

Suitable soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-1, A-2-4, A-2-5 and A-3 (or in accordance with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, SC) as determined by the Public Works Commission. Suitable material shall be free from roots, organic matter, trash, debris, frozen material or stones larger than three (3) inches in any dimension.

Unsuitable soil materials are defined as those in accordance with AASHTO Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, A-7 (or in accordance with ASTM D2487 soil classification groups GC, ML, MH, CL, CH, OL, OH, and PT) as determined by the Public Works Commission. Unsuitable material as defined above shall be replaced with select material as determined by the Public Works Commission.

Suitable materials determined by the Public Works Commission as too wet or too soft to provide a stable subgrade, foundation, or fill will be deemed as unsuitable regardless of soil classification. Materials deemed unsuitable shall be conditioned or replaced, as directed by the Public Works Commission. The Contractor shall recondition and stockpile the materials at no additional cost to the Public Works Commission.

EXCAVATION

All excavation shall be to the lines and grades indicated. The work shall consist of the excavation, placement, and compaction of suitable material as outlined in this Specification and proper disposal of all unsuitable materials. During excavation, suitable material for backfilling shall be stockpiled. The stockpiles shall be protected from contamination by unsuitable excavated material or other material. If any material becomes unsuitable, such material, if directed, shall be removed and replaced with suitable on-site or imported material from approved sources at no additional cost to the Public Works Commission.
Where the line parallels a creek and/or ditch the excavated material shall be stockpiled opposite the creek, with the trench separating the two. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes, or other approved methods. Grading shall be done to prevent surface water from entering the excavation. Any water within the trench shall be removed.

Suitable excavated material shall be stockpiled or placed in the excavation's backfill. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Unauthorized over excavation shall be backfilled with select bedding material at no additional cost to the Public Works

Commission. The Contractor, at their expense, shall properly dispose of all excess excavated material unless directed to place it in another area of the project by the Public Works Commission. The Contractor's obligation to remove and dispose of excess materials shall in no manner convey to him any rights of property in any material taken from any excavation.

It shall be the Contractor's responsibility to investigate the site and existing conditions. No compensation will be allowed due to excavation and/or grading being different than anticipated.

TRENCH EXCAVATION

The trench width shall be in accordance with the PWC standard details. All work shall be in accordance with the applicable OSHA regulations.

The subgrade beneath the centerline of the pipe shall provide uniform support for each section of the pipe. Stones three (3) inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed.

Where unsuitable material is encountered at the elevation established for installation of pipe or structures, additional undercut excavation shall be done as directed by the Public Works Commission. The additional undercut excavated area shall be backfilled with stone bedding material. Unauthorized undercut excavation shall be backfilled with stone bedding material and compacted as directed by the Public Works Commission. The Contractor shall conduct undercut operations in such a way that the Public Works Commission can take the necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the Public Works Commission, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation and will not be paid for such.

Where unsuitable material is encountered at the elevation established for installation of roads, parking lots, or other paved areas, additional undercut excavation shall be done as directed by the responsible agency (i.e., City of Fayetteville, Town of Hope Mills, NCDOT, etc.). The additional undercut excavated area shall be backfilled with stone bedding material. Unauthorized undercut excavation shall be backfilled with stone bedding material and compacted as directed by the responsible agency. The Contractor shall conduct undercut operations in such a way that the responsible agency can take the necessary measurements before any backfill is placed. Any material removed and backfilled without the approval of the responsible agency, and/or all necessary measurements taken, and/or to a depth, length or width exceeding the dimensions shall not be considered undercut excavation. All undercut excavation shall be in accordance with the NCDOT Standard Specification for Roads and Structures (most recent edition), or the responsible agency's specifications.

Excavation for manholes, meter vaults, or similar structures shall leave a minimum of 12-inches clear space around the structure. Removal of unsuitable material shall be as specified above. Preparation of the subgrade shall be in accordance with the applicable detail and as directed by the Public Works Commission.

PIPE LAYING

All pipe shall be installed in accordance with PWC Specification Section 02660 – Water Distribution, Specification Section 02730 – Sanitary Sewer Systems, and/or PWC Specification Section 02732 – Sewage Force Mains.

TRENCH SAFETY

All excavations shall comply with all Federal, State, and local rules and regulations. The Contractor shall have a trenching and shoring "competent" person on the job at all times when there is an open excavation. Under no circumstance shall an employee of the Public Works Commission be considered the "competent" person for the operation.

TRENCH STABILIZATION (SHORING)

The Contractor shall furnish, install, and maintain all necessary shoring to ensure a safe excavation. The method of shoring and excavation shall be in strict accordance with OSHA Regulations. The Contractor shall be responsible for installation, maintenance, and removal of all trench stabilization measures. The Contractor shall be responsible for any damage to adjacent structures resulting from the installation, maintenance, removal, or absence of trench stabilization measures.

DEWATERING

Excavations shall be kept dry at all times. Any required dewatering shall be the Contractor's responsibility. The Contractor shall be responsible for any damage to the adjacent property resulting from the installation, maintenance, discharge, and removal of the dewatering system. All discharge from the dewatering system shall be in accordance with the applicable erosion control rules and regulations.

BACKFILL

Backfill shall consist of suitable material free from debris, stone, etc. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. The backfill operation shall be conducted to prevent damage and/or movement of the pipe.

Backfill material in trenches shall be placed in layers not exceeding six (6) inches loose thickness to a point at least 12-inches above the pipe compacted to 90 percent maximum density. The remainder of the trench shall be backfilled in layers not exceeding six (6) inches in loose thickness compacted as specified in subparagraph COMPACTION. Each layer shall be thoroughly compacted by an approved mechanical tamping device.

Backfill material around structures shall be placed in a manner that the structure will not be damaged. No backfill shall be placed around manholes, thrust blocks, or similar structures until the concrete has been allowed to cure for three (3) days. The backfill material shall be compacted as specified in subparagraph COMPACTION.

No backfilling will be allowed when weather conditions prevent compliance with these Specifications.

BORROW EXCAVATION (Select Backfill)

Borrow excavation material shall be supplied by the Contractor when sufficient quantities of suitable materials are not available within the project limits. The borrow material shall be approved by the Public Works Commission and shall not contain roots, root mats, stumps, highly plastic clay or other

unsatisfactory materials. All borrow material shall be in accordance with the NCDOT Standard Specification for Roads and Structures, most recent edition.

COMPACTION

Backfill shall be compacted in accordance with the following table as a percentage of the maximum density at optimum moisture content as determined by the Standard Proctor Test, ASTM D-698.

Area	Percent ASTM D-698 Maximum Dry Density
Around and 1' above top of pipe	95
Remaining trench (within 4' of subgrade)	95
Pavement subgrade and shoulders	
Last 1' of fill (below subgrade)	100
Last 3' of fill to 12" below subgrade	98
Base material	100
Adjacent to structures (Areas not paved)	95
Under structures	98
Utility Outfalls (Cross Country)	95

Compaction testing may be performed at the option of the PWC Project Coordinator, or as required by the responsible agency (i.e., City of Fayetteville, NCDOT, etc.). Compaction testing shall be done in accordance with the responsible agency's requirements. Deficiencies shall be corrected by the Contractor without additional cost to PWC.

FINISHED EXCAVATION

All areas covered by the project shall be uniformly graded to the established elevations and approved cross sections. Ditches shall be graded to permit proper drainage. Newly graded areas shall be protected from traffic and/or from erosion, and any settlement or washing prior to acceptance shall be repaired and the required grades re-established. Ditches and drains along the subgrade shall be maintained to drain at all times. The finished subgrade shall be protected and maintained by the Contractor. The storage or stockpiling of materials on the finished subgrade shall not be permitted. No base course or pavement shall be laid until the subgrade has been checked and approved. All work shall be conducted in accordance with the environmental protection requirements of the Contract.

02272 EROSION CONTROL - GENERAL PROVISIONS

GENERAL

The Contractor shall be responsible for conducting his site grading and drainage operations in such manner as to prevent or lessen excessive soil erosion of the construction site work areas. He shall at all times provide satisfactory means to prevent or minimize the movement and washing of large quantities of soil. The Contractor is expected to review his site grading and drainage operations periodically to determine the areas most susceptible to erosion by excessive rainfall and periodically maintain all installed measures for the project duration. The Contractor shall correct any deficiencies or problem areas as directed by the Owner or the North Carolina Department of Environment and Natural Resources (NCDENR) inspector within 48 hours.

EXECUTION

The Contractor's attention is directed to the fact that unless exposed earth areas are properly cared for during construction, they may result in substantial sedimentation damage downstream from the construction area. He shall at all times provide satisfactory means to prevent or minimize the movement and washing of quantities of soil onto pavements or into adjacent ditches, swales, inlets, and drainage pipes, to avoid the possibility of these structures becoming clogged with soil. Should this happen as a result of erosion at the site of this construction, the Contractor will be required to immediately provide means for removal of the soil and/or debris from the structures to restore the proper functioning of these structures. The Contractor shall assume all responsibilities to the affected property owners for correction of all damages. The Contractor is expected to review his site grading and drainage operations periodically with the Owner with the view in mind of determining the areas most susceptible to erosion by excessive rainfall and shall take necessary temporary measures in sufficient time to minimize the washing away of the site soils that would likely occur before the areas are finished graded, topsoiled and planted. The temporary measures to be provided by the Contractor at the critical areas may consist of, but not limited to, any one or a combination of the following, or by other approved means selected by the Contractor:

Silt Fence
Gravel Construction Entrance/Exit
Inlet Protection

If any earthwork is to be suspended for any reason whatsoever for longer than 15 days, the disturbed areas shall be seeded with temporary vegetative cover or otherwise protected against excessive erosion during the suspended period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility for the erosion control and temporary measures will not be considered cause for a change in the price bid.

MAINTENANCE

The Contractor shall inspect and maintain each erosion control measure until the project is stabilized and accepted. After each significant rainfall, the Contractor shall remove and dispose of silt accumulation from each individual measure. The following maintenance may be required for each specific erosion and sediment control measure:

Silt Fence: Fabric shall be removed and replaced whenever deteriorated to such an extent the effectiveness is reduced. The toe of the fabric shall be buried a minimum of 6 inches.

Gravel Construction Entrance/Exit: Periodic top dressing with two inches (2") of graded stone. Remove all objectionable materials spilled, washed or tracked onto public roadways.

Sediment Trap: Remove sediment and restore trap to original dimensions when accumulated silt volume equals ½ the design depth. Replace the contaminated gravel facing.

Gravel Inlet Protection: Remove sediment as necessary to provide adequate volume. Replace contaminated gravel facing if required.

Rip-Rap: Make repairs to dislodged stone and/or supplement as required if erosion occurs during heavy rainfalls.

REMOVAL

After the area has been stabilized and the project accepted, the Contractor shall remove all temporary erosion and sediment control measures. Silt fences shall be removed, sediment traps/pits and/or basins filled with suitable soil, compacted and seeded. The materials removed shall remain the property of the Contractor and shall be disposed of off-site, or may be reused in other locations if approved by the Owner.

02273 TEMPORARY SILT FENCE

GENERAL

The work covered by this section consists of furnishing, installing, maintaining and removing a water permeable filter type silt fence for the purpose of removing suspended particles from the water passing through it.

The quantity of temporary silt fence to be installed will be affected by the actual conditions which occur during the construction of the project. The quantity of temporary silt fence may be increased, decreased, or eliminated entirely at the direction of the Owner. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

MATERIALS

Either wood posts or steel posts may be used. Wood posts shall be a minimum of 6 feet long, at least 3 inches in diameter, and straight enough to provide a fence without noticeable misalignment. Steel posts shall be 5 feet long, 1 3/4 inches wide and have projections for fastening the wire to the fence.

Wire fence fabric shall be at least 32 inches high, and shall have at least 6 horizontal wires. Vertical wires shall be spaced 12 inches apart. The top and bottom wires shall be at least 10 gage. All other wires shall be at least 12½ gage.

Burlap shall be at least 36 inches wide and shall weigh at least 6.7 ounces per square yard. Other materials may be used in lieu of burlap, provided those materials have been approved by the North Carolina Department of Environment and Natural Resources (NCDENR).

Wire staples shall be No. 9 staple and shall be at least 1½ inches long.

INSTALLATION

The Contractor shall install temporary silt fence as shown on the plans and details. The silt fence shall be constructed at the locations shown on the plans and at other locations directed by the Owner.

Posts shall be installed so that no more than 3 feet of the post shall protrude above the ground and at least 18 inches are driven into the ground. Filter fabric shall be attached to the wire fence fabric by wire or other acceptable means. The fabric shall be continual in length. The fabric shall extend into a 6"x 6" trench along the uphill side of the fence. The trench shall be backfilled and compacted. Place 6 inches of No. 57 stone along the toe of the fence to secure the fabric in place. The single stripe located approximately 6 inches form the silt fence outer edge should not be visible if the fabric and fencing are installed properly.

02274 GRAVEL CONSTRUCTION ENTRANCE/EXIT

GENERAL

The work covered by this section consists of furnishing, installing, maintaining and removing temporary gravel construction entrance/exits. The entrance/exit shall be located at points where vehicles enter and exit the project and as indicated on the plans to limit sediment "tracked" off the site.

Where there are differences or conflict between this specification and those requirements outlined in an approved Erosion Control Plan, the specifications in the erosion control plan shall take precedence

MATERIALS

The stone shall be two inch (2") to three inch (3") washed stone.

INSTALLATION

The Contractor shall install the gravel construction entrance as shown on the plans and details. The construction entrance shall be constructed at the locations shown on the plans and at other locations directed by the Engineer.

The area to receive the stone shall be cleared of all vegetation, roots and other objectionable materials. The subgrade shall be graded and properly compacted. Areas yielding shall be covered with engineering fabric or undercut as directed by the Engineer. The stone shall be placed, graded and compacted to a minimum depth of eight inches (8") and as shown on the plans. The minimum construction entrance dimensions shall be 50 feet in length and 12 feet in width. The construction entrance/exit shall be maintained and the stone supplemented throughout the life of the project and shall be removed upon stabilization and disposed of off-site at the Contractor's expense.

DIVISION 2
SITE WORK

02301 BORING AND JACKING (ROADWAYS AND RAILROADS)

GENERAL

Installation shall be by dry boring and jacking of a smooth wall steel pipe that is true to line and grade under roadways or where indicated on the plans, all in accordance with these specifications and recommendations of the pipe manufacturer. The Contractor shall notify the Public Works Commission's Project Coordinator a minimum of seven (7) days prior to any contemplated work. All required permits and approvals shall be secured prior to commencing work.

MATERIALS

Materials to be used shall be appropriate for the installation method chosen by the contractor. All materials shall be submitted to the Public Works Commission for approval, prior to the Contractor commencing operations.

DRY JACKING AND BORING

The casing pipe shall be spiral welded or smooth wall steel pipe in accordance with ASTM A53, Grade B having minimum yield strength of 35,000 psi. The carrier pipe installed for water or force main applications, within the casing pipe shall be CL 50 ductile iron restrained joint pipe. Use of pressure class ductile iron pipe for water mains is acceptable, in accordance with Specification Section 02660. Mechanical joint restraint systems (i.e., Mega-Lugs, grip-rings, field-lok gaskets, etc.) are not an acceptable means of restraint within the casing pipe for water mains or force mains.

The material for the gravity sanitary sewer carrier pipe shall be CL 50 ductile iron restrained joint pipe. All carrier pipes in sewer service shall have the appropriate lining and coating. Use of restraining gaskets (i.e., field-lok gaskets) is an acceptable means of restraint for gravity sewer mains. Use of mega-lugs (or equivalent) is not approved for restraint within casings.

The casing pipe minimum size and minimum wall thickness shall be in accordance with the following chart unless indicated otherwise on the drawings.

CARRIER PIPE (dia, in inches)	MIN CASING SIZE (inches)	WALL THICKNESS (inches)	RAILROAD WALL THICKNESS (inches)
4	10	0.188	0.188
6	12	0.250	0.281
8	16	0.250	0.281
12	24	0.250	0.375
16	30	0.312	0.469

18	30	0.312	0.469
24	36	0.375	0.532
30	42	0.500	0.625
36	48	0.500	0.688

The Contractor may substitute larger size casing pipe (particularly for sewer mains where grade and alignment are critical) with the proper wall thickness. A manual steering head or other approved guidance system is recommended for casing pipe 30 inches and larger and/or bores exceeding 100 feet in length.

INSTALLATION

Installation using the selected method shall be true to line and grade, where indicated on the plans, all in accordance with these specifications and recommendations of the pipe manufacturer. The Contractor shall notify all affected parties a minimum of seven (7) days prior to any contemplated work.

It is recommended that the Contractor perform each bore before beginning the sewer line construction. The boring shall be performed from the "upstream" to "downstream" direction maintaining the critical downstream invert elevation. Should the bore termination not be on grade, a revised plan shall be submitted to PWC Water Resources Engineering for approval. No additional payment shall be made for any required corrective actions. The boring operations shall be conducted at all times in such a manner so as not to create a hazard to nor impede the flow of traffic.

The Contractor will be responsible for any repair costs if any settlement or damage to the roadway or railroad bed resulting from the boring operation occurs within one year after completion of the work. The Contractor shall maintain proper insurance as required by the permitting agency.

The Contractor shall submit all requested information as required by the permitting agency.

DRY JACKING AND BORING

The alignment and grade of the jacking shall be carefully established prior to beginning the operation. A licensed professional land surveyor shall provide staking to establish the correct alignment and grade. The licensed surveyor (or a licensed professional engineer) shall provide cut sheets to the Public Works Commission and the contractor.

Lubricants such as bentonite may be applied to the outside of the pipe to reduce frictional resistance during jacking. The boring auger shall not be a greater diameter than the outside diameter of the encasement and removal of the excavated material ahead of the pipe will be held to a minimum to prevent the formation of voids.

Voids occurring outside the encasement pipe shall be filled with 1:3 Portland cement grout and the ends of the encasement pipe closed with masonry after the carrier pipe placement. The voids shall be filled with 1:3 Portland cement grout at sufficient pressure to prevent settlement of the roadway or railroad. The method of grouting shall be as approved by the permitting agency.

If the installed casing is deemed to be unusable by the Public Works Commission and/or the permitting agency, the casing shall be abandoned by bricking each end and filling the casing with grout, or as directed by the permitting agency.

The Contractor shall locate all existing utilities in the proposed location of the jack and bore. Design of the casing shall be in accordance with PWC standards, and subject to PWC approval. The casing should have a minimum separation of 12-inches from existing utilities.

In the event two parallel casings are being installed, the minimum separation between the outside edges of each casing shall be five (5) feet, or as directed by the permitting agency. In the event of a conflict between this specification and the permitting agency's requirements, the more stringent shall apply.

The use of "back-taps" is not encouraged. The design engineer shall take all necessary steps to determine the location of existing utilities and evaluate the necessity of a back-tap. Should it be necessary to install a back-tap, the top of casing shall be a minimum of 12-inches below the bottom of the pipe to be tapped. All pipe and fittings from the tap location to the carrier pipe shall be restrained joint. Use of mechanical joint restraint systems (i.e., mega-lugs, grip-rings, etc) are allowed in such instances. The Public Works Commission shall review and approve all proposed back-tap locations.

DIVISION 2
SITE WORK

02301-SP SPECIAL PROVISION FOR PILOT TUBE GUIDED AUGUER BORE AND JACK

GENERAL

Installation shall be of the smooth wall steel pipe for each guided bore and jack, and where specified on the Drawings and as defined in the Bid Form, each bore and jack shall be installed by pilot tube guided auger bore and jack. Unless otherwise noted here, all materials, minimum encasement size and wall thickness and installation requirements shall be consistent with the Drawings or as defined in Section 02301. The pilot tube guided auger bore and jack method employs an auger boring unit with a pilot tube's guidance and steering system. It normally requires multiple passes that upsize the pilot tube in order to install the casing or carrier pipe. The Contractor is responsible for surveying verifications of equipment setup and encasement installation.

MATERIALS
Reference Section 02301.

INSTALLATION

Reference Section 02301.

Pilot Tube Guided Auger Bore and Jack

The Pilot Tube Guided Auger Bore and Jack system shall utilize a two or three phase system as described below:

1. Three Pass System

   A. Phase 1 – A rigid steel pilot tube in approximately one-meter lengths shall be installed through the ground from the drive shaft to the receiver shaft by earth displacement with the jacking frame. The alignment of the pilot tube shall be established with a theodolite mounted at the rear of the drive shaft and accurately set to the desired line and grade. The theodolite shall view a lighted target in the lead or steering pilot tube. A camera shall be fitted to the theodolite and shall transmit the image of the crosshair and the target onto a monitor screen to be viewed in the drive shaft by the operator. As the operator advances the pilot tube through the earth the center of the target will drift from the crosshair as a result of the biased or slanted leading tip of the pilot tube. The operator shall rotate the pilot tube as required to orient the slanted steering tip toward the crosshair and continue to advance the pilot tube until it reaches the receiver shaft.

   B. Phase 2 – An enlargement casing with an outside diameter up to 1 ½" larger than the product pipe shall be rigidly connected to the final pilot tube and advanced into the earth behind the pilot tube. An auger shall be used inside the enlargement casing to remove the material being excavated. The auger shall be contained inside the limits of the enlargement casing as it progresses along the proposed alignment. A train of temporary steel casings with an outside diameter very similar to the enlargement casing and used to move the enlargement casing from the drive shaft to the receiver shaft. The enlargement casing will cut a bore hole from the drive shaft to the receiver shaft and the temporary casings will case the hole as it is cut. Each temporary casing shall be fitted

with an internal auger to transport the excavated material to the drive shaft where it shall be removed from the shaft and disposed of at an approved location. The pilot tubes shall be recovered in the receiver shaft as the temporary casings are installed.

C. Phase 3 – The product pipe shall then be installed directly behind the final temporary casing pipe with the jacking frame. The casing pipes and augers shall be recovered in the receiver shaft as the product pipe is installed.

2. Two Pass System

A. Phase 1 – The pilot tube shall be installed in the same manner described Phase 1 of the Three Pass System.

B. Phase 2 – The enlargement casing shall be installed in the same manner described in Phase 2 of the Three-Phase System. Each product pipe shall be fitted with an internal protective-casing pipe to house the auger and prevent damage to product pipe. The product pipe shall be installed directly behind the enlargement casing with the internal casing rigidly connected to the auger chamber of the enlargement casing. The internal casing shall be manufactured such that the excavated material does not leak excessively into the product pipe. The internal casing shall be fitted with a protective shoe to protect the product pipe from damage and to support the casing and auger at the centerline of the pipe.

The product pipe shall be advanced along the proposed alignment with the jacking frame thus progressing the enlargement casing from the drive shaft to the receiver shaft with the pilot tubes being recovered in the receiver shaft. The excavated material shall be funneled into and conveyed through the internal casing to the drive shaft where it shall be removed from the shaft and disposed of at an approved location. Upon reaching the receiver shaft the enlargement casing shall be removed and the internal casings and augers retracted and recovered at the drive shaft.

SECTION 02495 – GEOTECHNICAL INSTRUMENTATION AND MONITORING

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Work described under this section pertains to trenchless crossings, tunnels, blasting, and pile driving operations.

B. Furnish all materials, equipment, labor, and services required for the complete installation, maintenance, protection, and monitoring of instrumentation and reporting of collected data for all instrumentation on buildings, utilities, and in the ground adjacent to the site or on the site, as specified in this Section and as necessary to monitor construction performance and impacts on adjacent property.

C. Coordinate and obtain all permissions required, both public and private, to install geotechnical instrumentation.

D. Establish response actions to be taken, if the maximum allowable instrument readings are exceeded so that existing structures and utilities are protected from damage. Implement response actions, if maximum allowable instrument readings are exceeded.

E. Dispose of all instruments at the end of the project as instructed by the Engineer.

1. 2 SUBMITTALS

A. Submit for review by the Engineer the following information 2 weeks prior to instrument installation:

1. Full details of the proposed locations, types, and installation methods of the instruments.

2. The names, qualifications, and experience of the personnel or subcontractor(s) who will install the instruments, perform optical-level survey, or read the instruments and report data to the Engineer.

3. Copies of all instrument calibrations and certifications specified.

B. Within 1 week following installation, the Contractor shall submit to the Engineer drawings showing actual locations of the instruments and installation and baseline monitoring records. The installation and monitoring records shall include appropriate items from the following list, but not be limited to:

1. Project name and number.

2. Instrument type and number.

3. Planned and as-built location in horizontal position and elevation.

4. Personnel responsible for installation and/or monitoring.

5. Date and time of installation and/or monitoring.

6. Spaces for initial readings to be taken to ensure the instruments are working properly, or any necessary measurements as required to ensure proper installation.

7. A space on the record sheet for notes, including problems encountered, delays, unusual features of the installation, and details of any events that may have a bearing on the instrument behavior.

C. Submit data collected during the work as described in Paragraph 3.4 of this Section.

1.3 QUALITY ASSURANCE

A. The Contractor shall be responsible for all aspects pertaining to the installation, maintenance, and monitoring of the geotechnical instrumentation specified herein.

B. The Contractor's land surveyor registered in the State of North Carolina shall establish the deformation monitoring points at each trenchless crossing and take baseline readings.

C. The Contractor shall perform optical level surveys, instrument readings, and report data. Personnel responsible for this work shall be qualified by a minimum of 3 years of experience with similar work.

PART 2 – PRODUCTS

2.1 SURVEYING INSTRUMENTS

A. Elevations of all instrumentation shall be determined to an accuracy of plus/minus 0.01 feet.

B. Horizontal position of all instrumentation shall be determined to an accuracy of plus/minus 0.1 feet.

2.2 DEFORMATION MONITORING POINTS

A. Deformation monitoring points (DMPs) will be used to monitor vertical and horizontal deformation of various facilities as follows:

1. DMP - Type 1 (DMP 1) - Vertical deformation of paved areas, non-paved areas, or railroad tracks.

2. DMP - Type 2 (DMP2) - Vertical deformation and angular distortion of existing buildings and structures near construction activities, and at 50-foot maximum spacing along the exterior face of all existing buildings and structures located horizontally within 2 times the maximum excavation depth where sheeting and shoring is specified on the Drawings.

3. DMP - Type 3 (DMP3) - Vertical deformation of the rims on utility manholes.

B. The following three types of DMPs shall be used to monitor deformation.

1. DMP - Type 1, in paved areas, shall consist of a 2-inch-Iong masonry nail. The nail shall be manufactured from hardened zinc-plated steel. The masonry nail shall be driven into an asphalt covered surface. Each nail shall be individually identified by an identification tag or surface marking.

2. DMP - Type 1, in non-paved areas, shall consist of a 3-foot-Iong, 3/4-inch-diameter steel rod. The rod shall be driven into the ground or set in concrete in the ground such that no more than 3 inches of the rod is exposed above the ground surface. The top of the rod shall be rounded and punchmarked at its center. Each rod shall be individually identified by a surface marking.

3. DMP - Type 2 shall consist of brass bolts at least 1.5 inches long with 3/4-inch hexagonal heads securely and permanently installed for the full thread length in the surfaces to be monitored such that the elevation of a horizontal surface of each bolt head can be surveyed. Other device designs or possibly existing building foundation features may be used subject to approval by the Engineer prior to installation.

4. DMP - Type 3 shall consist of an observable cross mark or welded bead on the top horizontal surface of utility manhole rims. The surface within 3 inches of the point shall be cleaned and/or marked to permit easy identification of the exact point. The point shall also be clearly identified using fluorescent spray paint adjacent to the point.

2.3 SEISMOGRAPHS

A. Provide portable seismographs for monitoring the velocities of ground vibrations resulting from construction activities when necessary. Provide for full-time use on the project during blasting two (minimum) seismographs for each lasting operation which have been calibrated within the previous 12 months to standard that is traceable to the National Bureau of Standards. Required characteristics of seismographs are listed below:

1. Measure the three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.

2. Measure and display the maximum peak particle velocity component and air blast overpressure immediately after each blast.

3. Have a flat velocity frequency response with a minimum broad band of 6 Hz to 150 Hz with a tolerance equal to or better than plus or minus 10 percent.

4. Self-triggering wave-form capture mode that provides the following information: plot of wave forms, peak particle velocities, peak overpressure, frequencies of peaks.

5. Continuous monitoring mode must be capable of recording single-component peak particle velocities, and frequency of peaks with an interval of 1 minute or less.

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall demonstrate to the satisfaction of the Engineer proper installation of each instrument. The Contractor shall immediately replace, within 72 hours of damage, any instrument that becomes damaged or is destroyed for whatever reason at no additional cost to the Owner. If necessary, the contractor will suspend work in the areas being monitored by the damaged instrument and take remedial action.

B. The Contractor shall install instruments in accordance with the installation procedures that were submitted by the Contractor as specified in Paragraph 1.2 A and reviewed by the Engineer. Instruments shall be installed, and baseline data acceptable to the Engineer obtained before construction starts.

C. A factory calibration shall be conducted on seismographs prior to delivery to the site. Certification shall be provided to indicate that the test equipment used for this purpose is calibrated and maintained in accordance with the test equipment manufacturer's calibration requirements and that, where applicable, calibrations are traceable to the National Bureau of Standards.

D. The instrumentation and monitoring specified here is considered the minimum required. The Contractor shall obtain additional data from the instrumentation and*/or* furnish, install, and monitor additional instrumentation as necessary to adequately monitor construction performance and safety aspects of the work.

3.2 INSTALLATION OF DEFORMATION MONITORING POINTS

A. Install DMPs as described below at trenchless crossing locations. Additional DMPs may be required by the Engineer.

B. DMP - Type 1

1. In general, DMP - Type 1 (DMP1) shall be installed in the pavement or railroad tracks over the proposed jacked alignment in rows of three, oriented perpendicular to the pipe alignment. Monitoring points should be spaced at 20 feet on center along the center line and at 10 feet offset of the centerline in each direction. Locations may be modified to meet site constraints with the approval of the Engineer. The Engineer may require additional DMP1s be installed to monitor ground movements at other locations.

C. DMP - Type 2

1. DMP - Type 2 (DMP2) shall be installed on the exterior walls of buildings or structures located within 100 feet of excavations. As much as practical, DMP2s shall be installed on supporting walls or columns. Avoid installation in brick unless absolutely necessary.

2. Monitoring points on structures should be spaced no more than 50 feet along the outside of the building. As a minimum, four DMP2s shall be installed on the exterior wall corners of buildings, structures, or properties boundary walls. The Engineer may require additional DMP2s be installed to monitor building movement at other locations.

3. Install DMP2s in cooperation with property Owners so that installations are inconspicuous and acceptable to the property Owners. Existing features of building foundations that are permanent and can be repeatedly surveyed may be substituted for DMP2s, if approved by the Engineer.

D. DMP - Type 3

1. DMP - Type 3 (DMP3) shall be installed on the rim of manhole covers of utilities located within 100 feet of trenchless crossings.

E. Install and obtain DMP readings prior to beginning excavation, pipe jacking, or operation of groundwater control system at the site. The Contractor shall obtain two measurements for each DMP to establish the baseline data within 3 days of installation. These measurements shall be made at least 24 hours apart but not more than 48 hours apart. DMPs with initial surveyed elevations (or offsets as appropriate) differing by more than 2 millimeters shall be checked for secure installation and resurveyed.

F. The reading schedule of all DMPs surveyed should be daily during blasting, excavation, tunneling, and pipe jacking within 100 feet of the work and then at least weekly until all excavation, dewatering, and backfill has been completed. Additional surveys shall be made if excessive ground or building movement is noticed.

3.3 INSTALLATION OF SEISMOGRAPHS

A. Install seismographs to monitor vibrations at structures where construction activities that induce ground vibrations, including but not limited to blasting and pile driving, will occur within 500 feet of the structure. Seismograph locations shall include points on the ground surface between 3 and 6 feet from the faces of the nearest building(s). Seismographs shall be firmly mounted on the surface slab of concrete or asphalt or firmly set in undisturbed soils.

3.4 READING AND REPORTING

A. The Contractor shall collect, tabulate, plot, and interpret the survey monitoring data and provide the Engineer with the tabulated and plotted data as described below. Report the status of excavation, bracing, groundwater levels, pipe jacking, or backfilling at the time of data collection with each report.

B. All survey monitoring data shall be tabulated and plotted within 24 hours of collection and made available for the Engineer's review at the Contractor's field office. Communicate verbally with the Engineer immediately after visual observations or data collection, if excessive movements or other anomalies are indicated.

C. Seismograph readings shall be taken during blasting, pile driving, or other activities that cause ground vibrations to document that peak particle velocities do not exceed the blasting limit criteria.

D. Blasting Limit Criteria - The Contractor shall limit blasting to prevent damage to any adjacent building, structure, utility, or other feature near the site. The Contractor is solely responsible to determine the maximum vibration and air blast tolerable at each facility. However, in no case shall the following be exceeded:

1. Peak particle velocity (PPV) limits at ground surface at existing adjacent residential or other structures:

Frequency (Hz)	Maximum PPV (in./sec.)
Over 30	2.0
20 to 30	1.5
10 to 20	1.0
Less than 10	0.5

2. Peak Particle Velocity (PPV) limits at ground surface adjacent to new concrete.

Age of Concrete (from Batch Time)

Distance from Blast to Concrete (ft.)	1-3 days Max Charge Max. PPV (in./sec.)	Weight/Delay (lb.)	Over 7 days Max Charge Max. PPV (in./sec.)	Weight/Delay (lb.)
40 to 60	2.0	4.0	3.0	7.0
80 to 100	2.0	16	3.0	25
Over 150	1.25	32	2.0	50

E. Airblast Overpressure Limit:

1. The Contractor shall conduct all blasting activity in such a manner that the peak air blast overpressure measured at the location of the nearest above ground, occupied structure to air blast does not exceed 0.0014 psi.

F. Blasting shall not be permitted within 300 feet of locations where concrete has been placed in the preceding 24 hours. Blasting shall not be permitted within 40 feet of concrete structures until the concrete has attained the specified design strength.

G. The maximum allowable deformation measured at any DMP1 shall be 0.02 feet. The maximum allowable deformation measured at any DMP2 or DMP3 shall be 0.05 feet. The Engineer may alter these criteria, depending on the results of the pre-construction survey or previous movements at a particular location.

H. The Contractor shall make visual observations of ground conditions and building conditions in the vicinity of the site and communicate immediately with the Engineer, if signs of ground or building movements are observed.

I. Where DMP1s cannot be installed due to access limitations from roadway traffic, detailed visual observations of ground conditions shall be made, as much as practical, at the same frequency as DMP1 readings and the results reported to the Engineer.

J. The Engineer may take independent instrumentation measurements. Cooperate with the Engineer during instrumentation monitoring by providing access to the instrumentation locations in a timely manner and by providing and maintaining safe means of access to all instrumentation locations for data collection. Data acquired by the Engineer will be made available to the Contractor in a timely manner.

K. The Owner will provide the Contractor with benchmarks and datum for survey reference. All Contractor elevation surveys for geotechnical instrumentation shall begin and end at a benchmark. The Contractor should note that benchmarks may be within the radius of influence of the work and may settle. Re-check benchmark elevations periodically, as directed by the Engineer, using benchmarks outside the radius of influence of the work as a reference.

L. Protect all instruments from damage during the execution of the Contract. If any instrument is damaged, replace the damaged instrument and obtain new initial measurements immediately and at no cost to the Owner.

END OF SECTION

02500 – TRAFFIC CONTROL

GENERAL

The purpose of these specifications is to outline the Contractor's requirements for furnishing, erecting, maintaining, relocating, and removing traffic control devices for the maintenance of traffic during the Contractor's construction operations. The Contractor shall furnish all labor, materials, accessories, equipment and tools for performing all required traffic control operations.

REFERENCES

All work shall be in accordance with:

A. The North Carolina Department of Transportation Standards and Specifications for Roads and Structures (most recent edition)
B. The North Carolina Department of Transportation Roadway Standard Drawings (most recent edition)
C. The Manual on Uniform Traffic Control Devices (MUTCD) – most recent edition
D. The North Carolina Supplement to the MUTCD
E. Section 01000 – Special Conditions, of these Contract Documents

REQUIREMENTS

TRAFFIC CONTROL PLAN

The Contractor shall submit a traffic control and phasing plan for the overall project to be reviewed and approved by the PWC Project Engineer, prior to starting construction. The Contractor shall obtain an approved copy of the traffic control plan for the overall project area prior to any excavation within roadways. The plan must indicate how traffic will be managed, signage to be used, and potential traffic patterns resulting from plan implementation. The plan shall be submitted to the PWC Project Engineer in accordance with Section 01000 "Special Conditions" and Section 01300 "Submittals" of these Contract Documents. Failure of the Contractor to submit the required traffic control plan sufficiently in advance shall not entitle the Contractor to any extension of Contract Time.

TRAFFIC CONTROL DEVICES

The Contractor working in public rights-of-way on streets open to vehicular traffic, shall be required to provide, erect, and maintain all necessary traffic control devices throughout the project area to include any connecting streets affected by construction activities. The Contractor shall provide a sufficient number of personnel, and take all precautions for the protection of the work and safety of the public. All traffic control devices in place shall be in accordance with the approved traffic control plan. All traffic control devices and device installation shall be placed and maintained in strict accordance with the resources listed above.

The Contractor shall be liable for any damages resulting from using unapproved and/or inadequate work zone traffic control. The Fayetteville Public Works Commission reserves the right to stop any work for non-compliance. The Contractor shall have no claim for delay due to stoppage of work as a result of non-compliance.

TRAFFIC CONTROL PLAN AND ROAD CLOSURE NOTIFICATION

1. TRAFFIC CONTROL PLAN – The Contractor shall notify the PWC Project Engineer, in writing, by 5:00 p.m. Wednesday, indicating which roadways will be affected by the work the following week. The Contractor shall notify NCDOT of work to be done per the terms of the approved encroachment agreement. The PWC Project Engineer shall receive copies of all correspondence via fax or email (PWC fax 910-829-0203; email addresses will be provided at the pre-construction meeting).

Traffic cannot be altered without notification as outlined in the above paragraph. Failure to do so will result in the Contractor not being able to work within the street the next week.

No work on the individual streets shall start until all the traffic control devices required for the particular work activity have been installed in accordance with the approved traffic control plan.

2. ROAD CLOSURE NOTIFICATION - When deemed to be in the best interest of the public, the Fayetteville Public Works Commission and the Contractor, a street may be closed for a duration mutually agreed upon. The Contractor shall submit a request in writing to the PWC Project Engineer for approval to have a street closed. The PWC Project Engineer will forward the request to the appropriate agency (i.e., City, NCDOT) for approval of the closure. The PWC Project Engineer will include their recommendation regarding approval or disapproval of the request. The PWC Project Engineer will respond in writing with any recommendation for approval or disapproval of the request.

The request shall be submitted a minimum of five (5) business days prior to the desired closure date. The request shall include the street name and the limits of the closure based on the points of intersection. The request shall also state the proposed duration the street is to be closed and shall include a traffic control plan showing the detour route, traffic control devices, etc. The traffic control plan submitted shall be in accordance with the requirements listed in this Specification.

Once the street closure has been approved, in writing, by the PWC Project Engineer, the Contractor accepts full responsibility for the closure, to include the installation, maintenance, and removal of all traffic control devices and all implied liability.

TRAFFIC CONTROL LOOPS

The City of Fayetteville and NCDOT maintain traffic detection loops at various intersections throughout the project limits. Due to the location of the proposed utility improvements, it may be necessary for these detection loops to be damaged. The Contractor shall contact the City of Fayetteville Traffic Services at (910) 433-1660, a minimum of three (3) days prior to excavating, in order for the City to locate these loops, or make any necessary revisions to the traffic signal facilities.

The City of Fayetteville will hire a third-party contractor to repair the damaged traffic detection loops. The invoice for this work shall be submitted to the Contractor for payment. The cost for this shall be incidental to the Contract.

The Contractor shall contact NCDOT Traffic Services at (910) 364-0606, a minimum of three (3) days prior to excavating, in order for the NCDOT to locate these loops, or make any necessary revisions to the traffic signal facilities.The invoice for this work shall be submitted to the Contractor for payment. The cost for this shall be incidental to the Contract.

STEEL PLATING ROADWAYS

Steel plating shall not be used without the prior written approval of the Project Engineer. The Contractor shall submit their proposed plan to utilize steel plates a minimum of five (5) working days prior to the proposed activity. Plating shall only be considered if the trench depths are 14 feet or greater. Should plating be approved the Contractor shall adhere to the following:

1) The trench shall be adequately shored to support bridging and traffic loads.
2) The trench box shall be sealed so there are no open voids.
3) Steel plates shall rest on trench box.
4) Steel plates shall extend beyond the outer edges of the trench box on all four sides.
5) There must be a minimum of two (2) feet of compacted backfill above steel plates.
6) Compacted backfill shall match existing street grade.
7) Provide documentation that the plates are capable of supporting potential loads.

Steel plating shall not exceed two (2) consecutive calendar days in any given week. However, provided that work is progressing in that particular section of sewer the Contractor may be allowed to utilize plating for a longer duration as approved in writing by the Project Engineer.

STEEL PLATING ROADWAYS (NCDOT STREETS)

Steel plating within NCDOT streets shall be in accordance the current Standards and Specifications for Roads and Structures. Steel plating shall not be used without the prior written approval of the District Engineer. The Contractor shall submit their proposed plan to utilize steel plates a minimum of five (5) business days prior to the proposed activity. Should plating be approved, the Contractor shall adhere to the following:

1) The plates shall be secured against any movement from traffic. Options include "countersinking" the plates to be flush with the existing pavement, or bolting the plates to the pavement.
2) The plates shall overlap the excavation a minimum of two (2) feet on all sides.
3) The plates shall be sufficient to withstand the expected traffic loads.
4) Provide documentation that the plates are capable of supporting potential loads.

Steel plating shall not exceed two (2) consecutive calendar days in any given week. However, provided that work is progressing in that particular section of the project, the Contractor may be allowed to utilize plating for a longer duration as approved in writing by the District Engineer.

MATERIALS

A. The Contractor shall utilize interim pavement marking paint as specified in the North Carolina Department of Transportation Standards and Specifications for Roads and Structures (most recent edition)
B. Traffic cones may be utilized when approved by the Fayetteville Public Works Commission Project Engineer. If approved, traffic cones shall either be double stacked or weighted to prevent movement by traffic.

C. All traffic control devices furnished by the Contractor shall remain the property of the Contractor, unless otherwise specified in these Contract Documents.

INSTALLATION

The furnishing, erecting, maintaining, relocating, and removal of traffic control devices shall be in accordance with the MUTCD (most recent edition), the requirements outlined in the approved traffic control plan, and these Contract Documents.
All traffic control devices shall be in place prior to the Contractor beginning work, removed during intervals when work is not on-going, and removed at the end of each business day (unless otherwise approved, as outlined in this specification).
The Contractor shall not obstruct or impede any traffic on adjacent streets, during the installation or removal of the traffic control devices, or during construction.
The Contractor shall not close a lane to through traffic after normal working hours and during periods of construction inactivity, unless otherwise approved in writing by the Fayetteville Public Works Commission Project Engineer.
The Fayetteville Public Works Commission Project Engineer may restrict the Contractor from placing lane closures during certain hours, holidays, or as deemed necessary for the convenience of the public. All lane closure types, hours of installation, and durations shall be as approved in writing by the Fayetteville Public Works Commission Project Engineer.
The use of police and/or trained flaggers to control traffic through the work site shall be provided by the Contractor as required. The Contractor shall be responsible for obtaining trained personnel to direct traffic and contacting local authorities for use of police for traffic control where applicable.

INTERIM PAVEMENT MARKINGS

The Contractor shall be required to place interim pavement markings (centerlines, lane lines, edgelines, railroad, and school symbols) daily on any street with existing pavement markings that have been obliterated.

THERMOPLASTIC PAVEMENT MARKINGS

The Contractor shall be required to place thermoplastic pavement marking centerlines, lane lines, and edge lines within three (3) calendar days after the completion of the resurfacing operation.

The Contractor shall be required to place all thermoplastic pavement marking symbols (arrows, crosswalks, stop lines, school symbols, railroad symbols, raised pavement markers, etc.) within seven (7) calendar days of the completion of the project.

NCDOT STREETS

All traffic control measures for work within NCDOT road rights-of-way shall be in accordance with the approved NCDOT encroachment agreement, and as specified herein. Where there is a conflict between the requirements of this specification and the approved encroachment, the requirements of the approved encroachment shall govern.

DIVISION 2
SITE WORK

02573 PERMANENT PAVEMENT PATCH

GENERAL

Permanent pavement patching shall be completed as indicated on the Contract Plans and in accordance with these Contract Documents. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for replacement and correction of such defect as directed by the Public Works Commission. All materials and workmanship shall be in complete accordance with the standards and specifications of the Public Works Commission and subject to Public Works Commission inspection and approval. The materials and installation shall conform to the North Carolina Department of Transportation (NCDOT) Standards, (latest revision), the NCDOT HMA/QMS Manual (latest revision), and as specified herein.

REMOVAL

The Contractor shall cut the existing pavement to straight uniform widths parallel and perpendicular to the roadway. Jagged saw cuts will not be acceptable. The pavement shall be removed its entire depth. The Contractor shall properly dispose of all removed pavement. If the Contractor elects to mill the asphalt, the millings cannot exceed two (2) inches in size, and shall be swept into the trench and re-compacted. The removal limits shall extend a minimum of six (6) inches into solid undisturbed base course prior to patching or as directed by the Public Works Commission.

Pavement removal shall not exceed 3,000 feet total for the entire project at one time. It shall be the Contractor's responsibility to maintain the trench (swept, wetted, compacted, etc.) until paved.

PAVEMENT

Replacing the pavement shall consist of the following:

Tack Coat

All existing pavement edges shall be tacked in accordance with the North Carolina Department of Transportation Standard Specifications for Roads and Structures (latest revision).

Asphalt Surface Course

The asphalt surface course shall be Type S9.5, placed in accordance with the PWC Standard Detail M.2. All asphalt surface course shall be in accordance with the NCDOT HMA/QMS Manual (latest revision) and the North Carolina Department of Transportation Standard Specifications for Roads and Structures (latest revision).

The pavement repair shall be constructed to the line, grade, crown and cross section of the existing street. The asphalt plant mix shall be compacted to density in accordance with the HMA/QMS Manual (latest revision). The Contractor shall provide a smooth transition from the existing pavement to the top of the backfill, so as to have no vertical drop (in any direction). The transitions shall only be removed the day of patch paving.

The permanent pavement patch shall be made within 30 days of installation of the line. If settlement should occur within one (1) year warranty period, the Contractor shall be required to remove asphalt, re-compact base and sub-base, and re-patch any areas of settlement at no expense to PWC. All repairs shall be in accordance with these Contract Documents.

Base Course

The base course shall be aggregate base course (ABC) installed to a minimum eight (8) inches thickness (compacted) and extending a minimum of six (6) inches beyond the edge of the trench as indicated on the PWC Standard Detail M.2. The base course shall be compacted to 100% maximum dry density at optimum moisture content as determined by the AASHTO T-99 as modified by NCDOT.

The Contractor, with permission of the Public Works Commission, may use asphalt concrete intermediate course, placed in a minimum four (4) inch layer extending a minimum of six (6) inches beyond the edge of the trench as indicated on the Permanent Patch Detail. The Asphalt Concrete Intermediate Course shall be in accordance with the North Carolina Department of Transportation Standard Specifications (latest revision), and the NCDOT HMA/QMS Manual (latest revision).

Prior to patch paving, the Contractor shall remove the upper ten (10) inches of backfill, if ABC is to be used or upper six (6) inches if Asphalt Concrete Intermediate Course is to be used, in the trench. All asphalt edges along the trench shall be cut straight, uniform width, parallel and perpendicular to the road with no jagged edges. The outer six (6) inches (minimum) of the trench adjacent to the newly removed asphalt shall be on undisturbed soil.

The pavement repair shall be constructed to the line, grade, crown and cross section of the existing street. The asphalt plant mix shall be compacted to density in accordance with the HMA/QMS Manual.

Maintenance shall be performed at least weekly, after a rainfall, or at the direction of the Public Works Commission. Maintenance shall include sweeping the adjoining pavement, blading, wetting and compacting the stone to insure smooth drivable surface.

02660 WATER DISTRIBUTION

[Revised Dec 2019]

GENERAL

Water lines and all appurtenant items shall be constructed of materials specified and/or as indicated on the approved drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defects in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Fayetteville Public Works Commission (PWC) at no expense to the Fayetteville Public Works Commission.

RELATED SECTIONS

A. 02211 – Grading, Utilities
B. 02222 – Excavation and Backfilling for Utility Systems
C. 02301 – Boring And Jacking (Roadways And Railroads)

MATERIALS

MANUALLY OPERATED GATE VALVES

All manually operated gate valves four (4) inches and larger shall be ductile iron or cast iron body resilient wedge type rated for 250 psig working pressure gate valves and shall conform to American Water Works Association (AWWA) C-509/C-515 and NSF 61. All valves must open counter-clockwise equipped with a two (2) inch square operating nut. The operating nut shall have an arrow cut in the metal, indicating the direction of opening. All valves shall have a non-rising stem. All valves up to and including thirty-six (36) inch diameter shall have triple "O" ring stem seals. The design and machining of valves shall be such as to permit the replacement of the upper two (2) "O" rings without undue leakage while the valve is wide open and in service. The wedge shall be ductile iron encapsulated in nitrile rubber (for four (4) inch through 12 inch) and SBR rubber for 14-inch through 24-inch sizes.. All internal and external surfaces of the valve body and bonnet shall have a fusion bonded epoxy coating complying with ANSI/AWWA C550 applied electrostatically prior to assembly, conforming to AWWA C-550-90. All valves up to and including 36-inch diameter shall have a safe working pressure of 250 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve. All valves shall be tested for leakage and distortion in strict accordance with the latest revision of AWWA Specification C-500.

Gate valves installed in meter vaults shall have a wheel in lieu of a square operating nut and shall also have a non-rising stem. The wheel shall have an arrow cut in the metal indicating the direction of opening. Flanges shall not be buried. An approved pit shall be provided for all flange connections.

Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS-SP60. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter. The interior of the waterway in the body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve.

All valves shall be manufactured in strict accordance with the latest specifications of the American Water Works Association (AWWA). Valves shall be manufactured by: Mueller Company, Clow Corporation,

or American Darling Company. Certification shall be furnished to the Fayetteville Public Works Commission by the manufacturer that all valves are in accordance with PWC standards. Where specified on the plans and approved by the Fayetteville Public Works Commission, resilient wedge gate valves may be furnished with spur gearing for valves installed in a vertical position and bevel gearing for valves installed in a horizontal position. All gate valves shall be installed in accordance with PWC standard details.

BALL VALVES

For all valves smaller than four (4) inches, ball valves shall be used. Ball valves shall be installed in accordance with PWC standard details.

Ball valves shall be all bronze construction, with tee head operator and having a removable disc. Ball valves shall have threaded connections, in accordance with PWC standard details. Ball valves shall be manufactured and tested in accordance with AWWA/ANSI C800. The valve shall be equipped with packing nut, gland, and packing material. Ball valves shall be of an approved type made from approved materials conforming to ASTM Specifications and shall also meet the approval of the Public Works Commission. The turn required to travel from fully closed to fully open on the ball valve shall be 90 degrees.

VALVE BOXES

Valve boxes shall be "slip-type" made of close-grained, gray cast iron metal painted with a protective asphaltic coating. Construction shall be in three pieces as follows: The lower of base pieces, which shall be flanged at the bottom, the upper part which shall be flanged on the lower end, and of such size as to telescope over the lower part, the upper end being constructed in the form of a socket to receive the cap or cover; and the cover or cap shall have cast on the upper surface, in raised letters, the word "WATER". All valve boxes shall be equal in quality and workmanship to those manufactured by Sigma Corporation (VB-462), Tyler Union (6855 Series), Star Pipe Products (VB-0004), or an approved equal. The valve box shall be installed in accordance with PWC standard details. The valve box shall have a 3/8-inch hole drilled in the upper part four (4) to six (6) inches from the top of the box to accommodate a ¼-inch x 1-1/2-inch galvanized bolt for securing tracer wire.

Valve box protector rings shall be installed to protect valve boxes located outside pavement. The ring shall be constructed and installed in accordance with PWC standard details.

FIRE HYDRANTS

All fire hydrants shall be dry barrel, traffic type and conform to the latest revision of AWWA Specification C-502 except as listed below or as otherwise directed by the Public Works Commission. All working parts shall be bronzed. The size of the fire hydrants (designated by the nominal diameter of the valve opening) shall not be less than four and one-half (4 ½) inches. All hydrants shall be able to deliver a minimum of 1,000 gallons per minute with a friction loss of not more than five (5) pounds per square inch (psi) total head loss through the hydrant. Hydrants shall be of compression type (opening shall be of such design that when the barrel is broken off the hydrant valve will remain closed and reasonably tight against leakage). All hydrants shall be mechanical joint to accommodate the spigot end of six (6) inch Pressure Class 150, AWWA Standard, ductile iron pipe. The installation of the fire hydrant shall be in accordance with PWC standard details. Bosses (6") may be substituted for tees in pipe sizes exceeding 24 inches in diameter, with prior approval from PWC. The boss shall be welded to the bottom of the main to provide effective flushing of the system.

All hydrants shall be furnished with two (2) two and one-half (2 ½) inch nozzles and one (1) four and one-half (4 ½) inch pumper nozzle. Outlets shall have American National Standard fire hose coupling thread, in accordance with the City of Fayetteville standard, and shall be provided with nozzle caps securely chained to the body of the hydrant. The base of the hydrant shall have two (2) cast lugs suitable for use in strapping the hydrant to the connecting pipe. The operating nut shall be pentagonal in shape, finished with a slight taper to one and one-half (1 ½) inches from point to flat to conform to the standard wrench used by the Fayetteville Public Works Commission. All hydrants shall open left or counter-clockwise. Hydrants shall be suitable for working pressure of 150 psi and a test pressure of twice the working pressure. Fire hydrants shall be specific models manufactured by Mueller Company (Model Centurian 200), Clow Corporation (Medallion), American Darling (Model Mark 73-1) or approved equal. The interior of the hydrant shoe shall be coated with a four (4) mil thickness FDA approved epoxy coating.

COMBINATION AIR VALVES ASSEMBLY

Combination air valves shall be of the single housing style that combines the operation features of both an air/vacuum and air release valve. The combination air valve shall have a two (2) inch inlet and one (1) inch outlet connections and an orifice diameter to be determined by the Design Engineer for each project for a maximum working pressure of 300 psi. The assembly shall be equipped with a two (2) inch cut-off valve as shown on the PWC standard detail. The combination air valve body shall be constructed of 316 stainless steel or reinforced nylon with the only exception being the Buna-N Rubber seat and gasket. Valves shall be as manufactured by Crispin (Model UX20), ARI (D-020), or approved equal. Combination air valves shall be installed in accordance with PWC standards.

WATER DISTRIBUTION PIPE

DUCTILE IRON PIPE

All ductile iron pipe shall be designated as “Pressure Class”, unless otherwise specified. The pipe furnished shall have a minimum thickness calculated in accordance with ANSI A 21.50 (AWWA C-150), with a factor of safety of two (2); a working pressure of 150 psi to 350 psi, plus 100 psi water hammer allowance; and AASHTO H-20 live truck load with 2.5 feet of cover. In no case shall “Pressure Class” pipe’s nominal thickness be less than the following:

SIZE	PRESSURE CLASS	NOMINAL THICKNESS (In.)
4"	350	0.25
6"	350	0.25
8"	350	0.25
10"	350	0.26
12"	350	0.28
16"	250	0.30
24"	250	0.37

PUSH-ON JOINTS

Push-on joints shall be as specified and installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Push on joints, rubber gaskets and lubricant shall conform to ANSI A21.11. Pressure rating shall not be less than 200 psi unless otherwise specified. All ductile iron pipe shall be

lined with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI A21.4 (AWWA C-104). The pipe shall have an outside asphaltic coating as specified in AWWA Standard C-151.

RESTRAINED JOINTS

Factory Restrained Joints

Factory restrained joint pipe shall be utilized for all pipe greater than 12-inches in diameter, unless otherwise approved by the Fayetteville Public Works Commission. Factory restrained joint pipe shall be furnished for the locations shown on the approved drawings. The pipe, joints, and gaskets shall be in accordance with ANSI/AWWA Standards as specified for ductile iron pipe. Factory restrained joints shall be rated for a working pressure of 350 psi for sizes up to 12-inches and 250 psi for larger sizes.

All factory restrained joint pipe shall have the restraints internal to the pipe (i.e., "boltless"). All restrained joint ductile iron pipe and fittings larger than 12-inches shall be as manufactured by U.S. Pipe's TR-Flex, Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal. The method of restraining the valves to the factory restrained ductile iron pipe shall be reviewed and approved by PWC on a case by case basis. The valves shall have the same working pressure as the pipe.

Flanged Joints

Flanges shall be specifically designed for each application. The flange pipe shall be in accordance with ANSI/AWWA C-115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA 115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable.

Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C-110/A21.10 with a minimum working pressure of 250 psi. Gaskets shall be full faced SBR rubber per ANSI/AWWA C-111/A21.11 with a minimum 1/8 inch thickness. Linings and coatings shall be as previously outlined for all ductile iron pipe and fittings.

Mechanical Joints

Mechanical joints shall be as specified and installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for four (4) inch pipe through 12-inch pipe. Mechanical joints, rubber gaskets and lubricant shall conform to ANSI A21.11. Pressure rating shall not be less than 200 psi unless otherwise specified.

Special accessories such as mechanical joint retainer glands or mega-lugs are acceptable on pipe 12-inches and less in diameter, upon approval from the Fayetteville Public Works Commission. Mega-lug and/or grip-ring restraint mechanisms will not be an acceptable method of restraint for pipe, fitting and/or valves on sizes larger than 12-inches in diameter. For mains larger than 12-inches and at locations specified by the Fayetteville Public Works Commission, factory restrained joints shall be utilized, in accordance with these Specifications.

Field Lok Gaskets

Special accessories such as US Pipe's Field-LOK gasket, Ford's Uni-Ring, or Romac's Grip-Ring are acceptable on pipe 12-inches and less in diameter, upon approval from the Fayetteville Public Works Commission. Mega-lug and/or grip-ring restraint mechanisms will not be an acceptable method of restraint for pipe, fitting and/or valves on sizes larger than 12-inches in diameter. For mains larger than 12-inches and at locations specified by the Fayetteville Public Works Commission, factory restrained joints shall be utilized, in accordance with these Specifications.

FITTINGS

Mechanical Joint

All fittings shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11). Compact fittings shall be mechanically restrained, ductile iron in accordance with ANSI A 21.53 (AWWA C-153) for four (4) inch through 12 inch sizes only. Where thrust blocking is utilized, fittings shall be full body ductile iron in accordance with ANSI A 21.53 (AWWA C110).

All ductile iron fittings shall be lined with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI A21.4 (AWWA C-104). All fittings shall have an outside asphaltic coating as specified in AWWA Standard C-151 and C-110, respectively.

Factory Restrained

Factory restrained joint fittings shall be utilized for all pipe greater than 12-inches in diameter, unless otherwise approved by the Fayetteville Public Works Commission. Factory restrained joint fittings shall be furnished for the locations shown on the approved drawings. The fittings, joints, and gaskets shall be in accordance with ANSI/AWWA Standards as previously specified for ductile iron pipe. Factory restrained joints shall be rated for a working pressure of 350 psi for sizes up to 12-inches and 250 psi for larger sizes. All factory restrained joint fittings shall have the restraints internal to the fitting (i.e., "boltless"). All fittings shall be compatible with the factory restraint system. All restrained joint ductile iron fittings larger than 12-inches shall be as manufactured by U.S. Pipe's TR-Flex, Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal.

Bosses

Tangential welded on outlets (i.e., bosses) shall only be utilized on pipe 24-inches and larger, as approved by PWC. All bosses shall be factory welded; field fabrication is not allowed. The pipe shall be in accordance with these specifications. Bosses shall be of the size and location indicated on the approved drawings.

AERIAL CROSSINGS

For aerial crossings, the ductile iron pipe shall be thickness class, as specified on the plans and standard details. All thickness class pipe shall be in accordance with ANSI A21.51 and AWWA C-151, with a minimum working pressure of 200 psi.

For aerial crossings which are four (4) inches to 12 inches in diameter, Class 53 manufactured factory restrained joint or Class 53 flanged ductile iron pipe shall be used in accordance with the PWC standard details. No other means of restraint are allowed for aerial crossings. For aerial crossings larger than 12

inches, or as noted specifically on the plans, Class 53 flanged ductile iron pipe shall be used in accordance with the PWC standard details.

All aerial crossings shall be designed and installed in accordance with PWC standard details.

PIPE IN CASINGS

All ductile iron pipe (regardless of diameter) within casings shall be factory restrained, in accordance with these specifications and the applicable PWC standard details. The use of any other restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized on pipe within casings.

All restrained joint ductile pipe in casings shall be in accordance with the PWC standard details.

TRENCHLESS APPLICATIONS

All ductile iron pipe (regardless of diameter) utilized for trenchless installations (i.e., horizontal directional drilling, pipe-bursting, etc.) shall be factory restrained, in accordance with these specifications and the applicable specification section for the trenchless technology. The use of any other restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized.

PVC PIPE

Two (2) inch water main pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR21, pressure class 200 in accordance with ASTM D 2241. Fittings for two (2) PVC pipe shall be solvent weld Schedule 80 PVC. Brass FIP x pack joint for PVC fittings shall be used to transition from PVC to brass. The pipe shall be plainly marked with the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, date of manufacture, pressure rating and reference to appropriate product standards.

All PVC pipe (4-inches through 12-inches diameter) shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4,000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C-900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. The pipe joints shall be of the integral bell type with rubber gaskets and shall conform to the requirements of ASTM D-3139 or ASTM F-477.

PVC fittings are not acceptable for water mains four (4) inches or greater. Fittings and specials shall be ductile iron, bell end in accordance with AWWA C-110, 150 psi pressure rating unless otherwise shown or specified. Ductile iron fittings to PVC pipe shall be adequately supported on a firm trench foundation. Ductile iron fittings and specials shall be cement mortar lined (standard thickness) in accordance with ANSI A21.4.

Mechanical restraining systems (i.e. mega-lug, grip-ring) shall not be used on PVC pipe.

TRACING WIRE

For the purpose of locating non-metallic pipes, a continuous "detectable" tracing wire shall be installed. The wire shall be a minimum 12 gauge, single strand, coated copper or copper clad steel wire that is suitable for underground use. Splices shall be accomplished utilizing a corrosion proof wire connector.

The connectors shall "lock" the wires in place and contain a dielectric sealant to prevent corrosion. The connector shall be the "Snake Bite" connector manufactured by Copperhead Industries, LLC, or approved equal. The wire shall be buried continuously along the pipe. The wire shall be secured into valve boxes such that a direct/conductive metal detector may be used to trace the pipe location. Bolts shall be used to secure the wire and the attachment location shall be readily available from finished grade without special equipment.

POLYETHYLENE PLASTIC WATER TUBING

Polyethylene (PE) plastic water tubing shall be installed in accordance with PWC standard details. All services installed in new construction shall be one continuous run of pipe with no splices from the corporation stop to the meter. The PE water tubing shall meet the requirements of ASTM D2737, AWWA C901, and NSF Standards 14 and 61. Pipe dimensions shall meet Iron Pipe Size (IPS) standards.

The PE tubing material shall be high density polyethylene conforming to the minimum requirements of cell classification 445574E, as defined and described in ASTM D3350. The resin shall have a material designation code of PE4710 by the Plastic Pipe Institute.

The PE water tubing shall be SIDR 7, with a minimum pressure rating of 250 psi. Fittings for the PE water pipe shall be cast brass compression fittings, made to the PE water pipe dimension. All brass fittings shall have a 300 psi minimum pressure rating.

For the purpose of locating plastic water services during trenching, a continuous tracing wire shall be installed. The wire shall be a minimum 12 gauge, single strand, coated copper or copper clad steel wire that is suitable for underground use. The wire shall be buried along the water service lateral from the main to the meter box. The wire shall extend a minimum of 12 inches into the meter boxes.

COPPER WATER TUBING

Copper water tubing shall be installed in accordance with PWC standards. All services installed shall be one continuous run of pipe with no splices from the corporation stop to the meter.

Copper water tubing shall be Type K, soft copper manufactured in accordance with ASTM B88. The minimum pressure rating for the copper water pipe shall be 655 psi. Fittings for the copper water pipe shall be brass compression fittings, made to the copper water pipe dimensions. All brass fittings shall have a 300 psi minimum pressure rating.

TAPPING SLEEVES

Tapping sleeves shall be ductile iron mechanical joint or stainless steel and have a minimum working pressure of 150 psi for all tapping of mains up to and including 24-inch diameter with a branch less than or equal to 12-inches diameter. Branch diameter greater than 12-inches on a 16-inch diameter pipe and larger shall require full body ductile iron mechanical joint tapping sleeve.

Ductile iron mechanical joint tapping sleeves shall be as manufactured by Clow, M&H, Mueller, American, or an approved equal and shall be furnished with complete joint accessories. The mechanical joint sleeve shall be compatible with type and class of pipe being tapped. The outlet flange shall be class 125 per ANSI B16.1 compatible with approved tapping valves.

Stainless steel tapping sleeves shall be as manufactured by Romac, Smith-Blair, or approved equal, and shall be furnished with all accessories. The sleeve, lugs, bolts and nuts shall be 18-8 type 304 stainless steel, as provided by the manufacturer. The outlet flange shall be ductile iron or stainless steel. The gasket shall be a grid pattern design and shall provide full circumferential sealing around pipe to be tapped. The sleeve shall include a 3/4 NPT test plug. All welds shall be passivated. The outlet flange shall be class D per AWWA C-207-ANSI 150 lb. drilling compatible with approved tapping sleeves.

The tapping sleeve and valve shall be in accordance with PWC standard details.

All tapping sleeves shall be hydrostatically pressure tested prior to the tap being accomplished. **Use of air to complete the pressure test is not acceptable.** The tapping sleeve shall be tested to 150 psi. The PWC Project Coordinator shall witness and approve the testing.

WATER SERVICE SADDLES

All water service saddles for use on two (2) inch PVC shall be one (1) inch brass saddles as manufactured by Ford, McDonald, or Mueller.

Water service saddles for one (1) and two (2) inch taps on four (4), six (6), eight (8), 12-inch and larger size PVC and asbestos-cement (AC) and also four (4) inch and larger size iron pipe shall be ductile iron with stainless steel strap(s), bolts, nuts and washers. Ford Models FS 101, FS 202; Romac Models 101S, 202S; or Smith-Blair Model 315.317 shall be used. Stainless steel straps must be pre-formed at the factory to the specified outside diameters of the pipe.

Water service saddles with a two (2) inch outlet shall be double strap.

Water service saddles for pipe sizes 12-inch through 24-inch shall be double strap.

Water service saddles for pipe sizes exceeding 24-inches shall be as specified by the PWC Water Resources Engineering Department.

INSTALLATION

GENERAL

Pipe installation shall be in strict accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems and as outlined herein.

PIPE INSTALLATION

Pipe installation shall be in accordance with the manufacturer's instructions. All pipes and fittings shall be handled to prevent damage to the protective coatings and linings.

All dust, dirt, oil, tar, or other foreign matter shall be cleaned from the jointing surfaces, and shall be lubricated with lubricant recommended by the manufacturer.

All pipe shall be installed in accordance with the approved drawings and cut sheets, unless otherwise directed by PWC.

All dead ends on new mains shall have a two (2) inch blow-off assembly as indicated on the approved drawings. The blow-off assembly shall be in accordance with PWC standard details.

For pipe sizes up to 12-inches, mechanical equipment should not be utilized to assemble the pipe. For pipe sizes over 12-inches, mechanical equipment may be utilized, in accordance with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by PWC.

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment shall not be allowed. The Contractor shall verify line and grade after assembling each joint.

When pipe installation is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the PWC Project Coordinator. If water is present, the plug shall remain in place until the water is lowered to a level that allows for proper installation. No pipe shall be laid in water or where in the PWC Project Engineer's and/or PWC Project Coordinator's opinion trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

ALIGNMENT AND GRADE

The Contractor shall be responsible for installing the pipe and appurtenances to proper line and grade.

All ductile iron pipe and fittings shall be installed in accordance with ANSI/AWWA C-110/A21.10. All C-900 pipe shall be installed in accordance with ASTM D-2774. The amount of deflection in the PVC or ductile iron pipe shall not exceed the applicable AWWA standards and the manufacturer's recommendations. If the required deflection exceeds the specified limitations or as determined by the Public Works Commission, mechanical joint bends shall be utilized.

Pipe passing through walls of NCDOT bridges, retaining walls, and other concrete structures shall be factory restrained joint ductile iron and be installed in casings/sleeves in accordance with NCDOT specifications. Annular space between walls and sleeves shall be filled with an approved cement mortar that meets NCDOT specifications. The annular space between the sleeve and the pipe shall be filled with an approved mastic.

Pipe passing through the walls of meter vaults, valve pits, and storm drainage structures shall be restrained joint ductile iron, as specified by PWC. Pipe shall be installed in a casing/sleeve if determined to be necessary. Annular space between walls and sleeves shall be filled with an approved cement mortar. Annular space between pipe and sleeves shall be filled with an approved mastic. Proposed conflict boxes with storm and water shall be reviewed by the PWC Water Resources Engineer and approved on a case by case basis.

All ductile iron pipe (regardless of diameter) within casings shall be factory restrained, in accordance with these specifications and the applicable PWC standard details. The use of mechanical restraints (i.e., mega-lugs, grip-rings, etc.) shall not be utilized on pipe within casings.

When pipe is field cut, the cut end shall be smooth and at right angles to the axis of the pipe. All sharp edges shall be removed. All field cut pipe shall be beveled. The beveled end of PVC pipe shall be removed, when installing into mechanical joint ductile iron fittings.

When connecting unlike (class, material, etc.) pipe, an approved PWC fitting shall be used. All pipe shall be installed in accordance with AWWA C-600 or C-605 as applicable, for buried lines and the manufacturer's recommendations. For mechanical joint pipe and fittings, all nuts shall be torqued to the manufacturer's recommendations.

Concrete thrust blocking shall be utilized on all PVC water mains. The concrete thrust blocking shall be in accordance with PWC standard details. When thrust blocking is to be utilized, backfilling shall not occur until the concrete has time to set. No hydrostatic pressure testing shall occur until the concrete thrust blocking has cured for a minimum of five (5) calendar days.

FIRE HYDRANTS

Fire hydrants shall be installed as shown on the approved drawings. Each fire hydrant shall be connected to the main with a six (6) inch branch line and shall have a minimum of 42-inches of cover. Fittings between the valve and fire hydrant may be utilized, with prior approval from PWC. The valve shall be located at the main unless otherwise approved by PWC. Hydrants shall be set plumb with pumper nozzle facing the roadway. The hydrant branch shall not be backfilled until inspected and approved by the PWC Project Coordinator. Fire hydrants shall be installed in accordance with PWC standard details.

HYDROSTATIC TESTS

All mains and laterals shall be subjected to a hydrostatic pressure test. Each valved section maybe tested individually.

The Contractor shall furnish all labor and material, including test pumps, taps, and corporations, necessary to complete the work. Any taps which are not to be utilized shall be killed out at the main. If any taps are to be used for irrigation laterals they shall be installed in accordance with PWC standard details. A PWC Project Coordinator shall be present and observe all valve operation by the Contractor. Under no circumstances shall a Contractor operate any PWC-owned valves unless it is an emergency.

The duration of the pressure test shall be at least one hour or longer, as directed by the PWC Project Coordinator. The hydrostatic pressure shall be 200 psi. The pipe to be tested shall be slowly filled with water and the specified test pressure shall be applied. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow offs are not located to properly expel the air, taps shall be made as approved by PWC.

Damaged or defective materials discovered as a result of the pressure test shall be removed and replaced with new material, and the test shall be repeated until the test results are satisfactory to the Public Works Commission.

All replacement, repair or retesting shall be accomplished by the Contractor at no additional cost to the Public Works Commission. All repairs shall be reviewed and approved by PWC prior to backfill. The use of couplings, fittings, sleeves, etc. shall be reviewed and approved by PWC prior to use. The main must successfully pass the hydrostatic test prior to sterilization.

STERILIZATION

Sterilization shall be in accordance with the requirements of NCDEQ, the North Carolina Rules Governing Public Water Supply, AWWA C651, and AWWA C655 (most recent editions). The

Contractor shall furnish all chlorinating equipment, sterilization solution, materials, excavation, barricades, backfilling, and any taps and corporations necessary to complete the work. The Contractor shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

Prior to performing the hydrostatic test, water mains, laterals, and appurtenances shall be flushed to remove air, sediment, contaminants, and/or foreign matter. After completion of a successful hydrostatic test, the water system shall be disinfected by the thorough dispersion of a chlorine solution. The chlorine level shall be between 50 parts per million (ppm) and 100 ppm throughout the water system. In no case shall the chlorine level exceed 300 ppm. If the chlorine level is over 300 ppm, the system shall be completely flushed and re-chlorinated. **In no case shall chlorine be introduced into the water system in a dry solid state.**

The chlorine solution shall remain in contact with the interior surfaces of the water system for a minimum period of 24 hours and shall result in not less than 10 ppm of chlorine throughout the system. Then the water system shall be flushed with water from the existing PWC water system until the chlorine solution is dispelled. The Contractor shall take all necessary measures to prevent downstream erosion caused by flushing the lines. All erosion/damages shall be repaired at no additional expense to the Public Works Commission. All environmental regulations governing the release and/or disposal of chlorinated testing water shall be met by the Contractor. AWWA C655 defines “highly chlorinated” water as water having more than four (4) ppm. Any water with a chlorine level greater than four (4) ppm shall be de-chlorinated by the Contractor prior to being released to the environment.

If any disruption to the disinfection process occurs, or if any repair procedure is necessary then the disinfection process shall start over.

After disinfection, the water supply shall not be accepted or placed into service until bacteriological tests results or representative water samples analyzed in the Public Works Commission’s laboratory are found to be satisfactory. The disinfection shall be repeated until tests indicate the absence of pollution for at least two (2) full days. The PWC Project Coordinator shall be responsible for taking the sample(s) and transporting them to the PWC laboratory.

If the initial sample taken after disinfection and flushing does not indicate that the water main is sterilized, the Contractor shall, in conjunction with the PWC Project Coordinator, flush the lines. Once flushing is complete, another sample will be taken to the Public Works Commission’s laboratory for analysis. Should this second sample also fail to indicate that the main is sterilized; the Contractor shall repeat the disinfection process. This process shall be repeated until the samples are satisfactory. The Contractor shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

02730 SANITARY SEWER SYSTEMS

GENERAL

Sanitary sewer lines and all appurtenant items shall be constructed of materials specified or indicated on the drawings. The intent and purpose of these specifications is to require a complete and satisfactory installation in every respect and any defect in material or workmanship shall be cause for the replacement and correction of such defect as directed by the Public Works Commission.

RELATED SECTIONS

A. 02211 – Grading, Utilities
B. 02222 – Excavation and Backfilling for Utility Systems

MATERIALS

SEWER MAINS

Prior to shipment each joint of pipe shall be stamped by an independent testing laboratory, certifying compliance with the specifications stated therein. Pipe sizes indicated shall be understood to be nominal inside diameter of the pipe. All sewer pipe materials shall be either PVC (as specified herein) or ductile iron (as specified herein), unless otherwise approved in writing by the Public Works Commission. Written approval shall be obtained prior to installation.

DUCTILE IRON PIPE

All ductile iron pipe and fittings shall be in strict accordance with ANSI A21.51 and AWWA C151, Class 50 or Class 51, as applicable, in every respect. The working pressure shall be a minimum of 200 psi. Pipe shall be furnished in 18 or 20-foot lengths. All pipe joints used in open trench construction shall be furnished with "push-on" joints, unless otherwise indicated on the drawings or specified. All joints and fittings shall be in accordance with ANSI A21.11 and AWWA C111. All ductile iron interior surfaces shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils (Protecto401 or approved equal). The exterior pipe surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110. Specifications for the ceramic epoxy can be found in Specification Section 09802.

For aerial crossings which are 4 inches through 12 inches in diameter, manufactured restrained joint ductile iron pipe Class 53, or Class 53 flanged ductile iron pipe shall be utilized in accordance with the standard Public Works Commission detail for aerial crossings. Mega-lugs, field-lok, and gripper rings are not an allowable means of restraint for aerial crossings. For aerial crossings larger than 12 inches, or as noted specifically on the plans, flange joint ductile iron pipe, Class 53, shall be utilized in accordance with the standard Public Works Commission details. The location of flanges shall be specifically designed for each application. The flange pipe shall be in accordance with ANSI/AWWA C-115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA 115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable. Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C-110/A21.10 with a minimum working pressure of 250 psi. Gaskets shall be full faced SBR rubber per ANSI/AWWA C-111/A21.11 with a minimum 1/8” thickness. Linings and coatings shall be as outlined for ductile iron pipe.

If the Public Works Commission determines that an expansion coupling is required, it shall be installed as indicated on the drawings. The expansion coupling shall not be buried.

For subsurface water crossings (i.e., streams, wetlands), restrained joint ductile iron pipe shall be utilized. No mechanical restraint systems (e.g., mega-lugs, field-lok gaskets, etc.) shall be utilized. The pipe shall be installed in a casing, in accordance with the approved Public Works Commission detail, unless otherwise specifically approved by the Public Works Commission.

PVC PIPE

PVC sewer pipe and fittings 4 inches thru 15 inches shall be in accordance with ASTM D-3034 with a standard dimension ratio (SDR) of 26 for sewer mains and laterals. Larger diameter pipe (18 inches through 27 inches) shall be in accordance with ASTM F-679, with a SDR of 26. Both pipe and fittings shall be made of PVC plastic having a cell classification of 12454 as specified in ASTM D-1784.

Pipe joining shall be push on elastomeric gasket joints only and the joints shall be manufactured and assembled in accordance with ASTM D-3212. Elastomeric seals shall meet the requirements of ASTM F-477. The pipe shall be furnished with integral bells and with gaskets that are permanently installed at the factory and in accordance with ASTM D-3212 and contain a steel reinforcing ring. PVC sewer pipe shall be made by continuous extrusion of prime green unplasticized PVC and contain identification markings as required by the applicable ASTM standard.

SEWER FITTINGS

Ductile Iron Push-on Fittings:

Ductile iron sewer fittings on PVC mains shall be deep bell, gasketed joint, and air test rated. Gasket groves shall be machined in the factory. Material shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12 and ASTM F1336. Wall thickness shall meet the requirements of AWWA C153. Gaskets shall have a minimum cross sectional area of 0.20 square inches, and conform to ASTM F477. All ductile iron fittings shall have an interior coating of Protecto 401, or approved equal. All ductile iron fittings on PVC pipe shall provide a flow line that provides a smooth transition between the materials. Ductile iron fittings shall be as manufactured by the Harrington Corporation (Harco), or approved equal.

Mechanical Joint Fittings:

Joints shall be installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for four inch (4") pipe and larger. Fittings and specials shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11). Compact fittings shall be ductile iron in accordance with ANSI A 21.53 (AWWA C-153) for 4" thru 24" sizes only. Note: mechanical joint wyes are not included in the AWWA C-153 specification. Pressure rating shall be not less than 200 psi unless otherwise specified. All ductile iron fittings shall have an interior coating of Protecto 401, or approved equal. Mechanical joint fittings shall be utilized on ductile iron mains and ductile iron laterals. Mechanical joint fittings shall not be utilized on PVC mains, unless otherwise approved by the Public Works Commission.

PVC Fittings:

PVC fittings shall be manufactured in accordance with ASTM D-3034, F-1336, and F-679. Molded fittings shall be utilized in sizes from 4” to 8” (or larger, if available). Fabricated fittings shall only be

utilized with prior approval from the Public Works Commission. Fabricated fittings are defined as those fittings that are made from pipe or a combination of pipe and molded components. All PVC fittings shall contain identification markings as required by the applicable ASTM standard. All PVC fittings shall be gasketed joint, except as indicated for interior drop structures. Plastic fittings shall be as manufactured by GPK Products, Inc., Plasti-Trends, the Harrington Corporation (Harco), or approved equal.

Ductile Iron Pipe Size x SDR26 Transition Adapter:

All ductile iron x PVC transition adapters shall be one (1) piece, bell x bell (gasket x gasket). Transition adapters shall range in size from four (4) inches through 12 inches. Transition adapters for pipe larger than 12-inches shall be as specified by the Public Works Commission. All transition adapters shall have a flow way tapered to allow a smooth transition between the ductile iron and PVC. Transition adapters shall be either PVC or ductile iron, in accordance with the following:

PVC – All PVC transition fittings shall be made from DR 18 C900 pipe stock. The C900 pipe stock shall meet the requirements of AWWA C900/C905, and have a minimum cell classification of 12454 as defined in ASTM D1784. The wall thickness shall meet or exceed DR 18. PVC transition fittings shall have SBR gaskets in accordance with ASTM F477. All six (6) inch and eight (8) inch adapters shall be molded. Molded fitting joints shall be 235 psi rated, in accordance with ASTM D3139, and shall have SBR rubber gaskets. Four (4) inch, ten (10) inch and 12 inch transition adapters shall have SBR Rieber style gaskets meeting ASTM F477. Joints shall be 235 psi rated, in accordance with ASTM D3139 for the C900 (ductile iron) bell, and in accordance with ASTM D3212 for the sewer (SRD26) bell. Molded C900 bell depths shall comply with AWWA C907. Fabricated (4-inch, 10-inch and 12-inch) bell depths and molded sewer (SDR26) bell depths shall be in accordance with ASTM F1336. PVC transition adapters shall be manufactured by the Harrington Corporation (Harco), GPK Products, or approved equal.

Ductile iron – Ductile iron transition fittings shall be deep bell, push-on joint, and air test rated. The ductile iron material shall comply with ASTM A536, Grade 65-45-12 or 80-55-06. The bell depth shall be in accordance with ASTM F1336. Gaskets shall be of SBR rubber, in accordance with ASTM F477. Transition gaskets are not allowed. All ductile iron transition fittings shall have an interior coating of Protecto401 or approved equal. Ductile iron transition fittings shall be manufactured by the Harrington Corporation (Harco) or approved equal.

Saddles:

Sewer service saddles may be utilized for sewer lateral installations. All sewer service saddles shall be ductile iron with stainless steel straps, bolts, nuts, and washers. The nuts shall be coated to prevent galling. The saddle body shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12. The gasket material shall be SBR, in accordance with ASTM D2000. Saddles for PVC or DI laterals shall have an alignment flange. Sewer service saddles shall be as manufactured by Geneco, or approved equal. All stainless steel straps shall be pre-formed at the factory, to the specified outside diameters of the pipe.

SEWER LATERALS

Ductile iron laterals – For ductile iron mains, utilize mechanical joint fittings or an approved saddle with an alignment flange (Geneco or approved equal). For PVC mains, utilize an approved saddle with an alignment flange (Geneco or approved equal) or ductile iron fittings as specified above.

PVC laterals – utilize a saddle with an alignment flange (Geneco or approved equal) on PVC or ductile iron mains; utilize a mechanical joint tee with SDR 35 transition gaskets on ductile iron mains; or utilize PVC fittings as specified above on PVC mains.

The following table summarizes the materials to be utilized for sewer main to lateral connections:

	PVC Main	DI Main
DI Lateral	DI fitting or approved saddle	MJ fitting or approved saddle
PVC Lateral	PVC fitting or approved saddle	MJ fitting with transition gasket or approved saddle

Sewer laterals shall be in accordance with these Specifications and PWC standard details S.10, S.11, and S.12.

PRECAST CONCRETE MANHOLES

Pre-cast circular reinforced concrete manhole units shall be in accordance with ASTM C-478. The tongue and groove ends of the manhole sections shall be manufactured for jointing with rubber gaskets (i.e., con-seal). An eccentric cone shall be utilized on all manholes, unless otherwise approved by the Public Works Commission.

Manhole steps shall be placed in all manholes and shall be steel reinforced (½" grade 60) copolymer polypropylene plastic steps in accordance with ASTM C-478 for material and design. The steps shall be spaced 16" on center with serrated treads and wide enough to stand on with both feet.

Manhole frames and covers shall be made of gray cast-iron, and the iron shall possess a tensile strength of not less than 18,000 psi. Cast iron shall conform to ASTM Specification A 48-83 Class 35. The frame and cover shall be manufactured by the same manufacturer. All castings shall be in accordance with Public Works Commission standard details. Any defective castings shall be removed and replaced.

Any special linings and coatings that are specified for a manhole and installed at the production facility, in the field, or during repairs, shall be applied in accordance with the applicable special coatings specification and the manufacturer's specifications for that material.

Camlock ring and covers shall be in accordance with Public Works Commission standard details. Camlock bolt head shall be compatible with PWC standard tool for turning camlock mechanism. Camlock ring and covers shall be installed as indicated on the drawings, in accordance with PWC standard details.

SELECT BEDDING MATERIAL

Select bedding material shall be crushed stone (No. 57 or No. 5), in accordance with Public Works Commission standard details. Bedding material shall be provided for all pipe materials.

INSTALLATION

Pipe installation shall be in strict accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems and as outlined herein.

PIPE LAYING

Pipe installation shall be in accordance with the manufacturer's instructions. Proper equipment shall be utilized to perform the work in a manner satisfactory to PWC. All pipes and fittings shall be carefully

lowered into the trench in such a manner to prevent damage to the protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench. Pipe shall be carried into position and not dragged.

All dust, dirt, oil, tar (other than standard coating), or other foreign matter shall be cleaned from the jointing surfaces, and the gasket, bell, and spigot shall be lubricated with lubricant recommended by the manufacturer.

The pipe shall be laid upgrade, beginning at the lower end with the tongue or spigot ends pointing in the direction of the flow to the correct line and grade, unless otherwise approved by PWC. The pipe section to be installed shall be aligned by batter board or laser beam with the last installed pipe section. Mechanical equipment should not be used to assemble the pipe. Pipe shall be assembled in accordance with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by PWC.

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment shall not be allowed. The Contractor shall verify line and grade after assembling each joint.

At any time when pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the PWC Project Coordinator. If water is in the trench, the plug shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or where in the PWC Project Engineer's and/or PWC Project Coordinator's opinion trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

ALIGNMENT AND GRADE

All pipe shall be installed to the required lines and grades. Structures shall be installed at the required locations. The lines and grades of the pipe will generally be indicated by stakes parallel to the line of the pipe. The Contractor shall be responsible for installing the pipe to proper line and grade.

Pipe shall be visually inspected by shining a light between structures and /or by closed circuit television inspection. Any defects discovered, including poor alignment, shall be corrected as directed by the Public Works Commission.

The bottom of the trench shall be excavated to a minimum of four inches (4") below the outside bottom of the pipe being installed to allow adequate placement and compaction of bedding material prior to installation.

Select bedding material shall be placed a minimum of four inches (4") and a maximum of six inches (6") under the pipe for full width of the trench and halfway up the pipe on the sides. Bedding material shall be placed in layers not exceeding six inches (6") loose thickness for compacting by vibratory mechanical tamps under the haunches and concurrently on each side of the pipe for the full width of the trench. The final result shall be "Class B" bedding for rigid pipe. If the existing material under the pipe bedding material is unsuitable, the unsuitable material shall be removed and replaced with select bedding material (No. 57 or No. 5 stone), as authorized and approved by the Public Works Commission Project Coordinator.

The same material pipe shall be utilized from manhole to manhole, unless otherwise approved by PWC. If the section of pipe between manholes is 250 feet or less, no transitions will be allowed (either all PVC or all ductile iron). Should the length between manholes exceed 250 feet, only one transition will be allowed. Use of a C900 x SDR 26 adaptor shall be used to accomplish the transition. A transition is

defined as the use of one C900 x SDR26 adaptor. No more than one (1) adaptor shall be utilized in any given manhole to manhole segment.

All manholes shall be constructed to Public Works Commission's standards. Installation shall be in accordance with ASTM C-891 and PWC standards.

Manholes shall be constructed of precast reinforced concrete circular sections installed on a base riser section with integral floor and shall be cored to accommodate the various pipe connections, as indicated on the drawings. Pipe connections to a manhole shall be by gasketed flexible watertight connections (boot for small diameter and A Loc for larger diameter pipe) or as approved by the Public Works Commission. The manhole size shall be in accordance with the following table, unless otherwise specified:

Pipe Size	Manhole Diameter **
24" and less	48" *
27" - 36"	60"
42"	72"

* Where interior drop structures are required, use 60" diameter as required in the Public Works Commission standard details.
** Where multiple connections or acute angles are required, larger diameter manhole may be required as indicated on the plans.

The invert channel shall be constructed of brick and mortar, in accordance with Public Works Commission standard details. **Precast inverts are not allowed**. The invert channel shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in direction of flow shall be made with a smooth curve as large as a radius as the size of the manhole will permit without a decrease in flow velocity. Changes in size and grade of the channel shall be made gradually and evenly. The invert channel walls shall be constructed to three quarters (3/4) of the height of the crown of the outlet sewer and in such a manner not to obstruct maintenance, inspection or flow in the sewers. The inverts shall have a minimum slope of one (1) percent across the bottom of the manhole. A shelf shall be provided on each side of any manhole invert channel. Inverts in manholes with standing water will not be acceptable. The shelf shall be sloped not less than 1:12 (min) and no more than 2:12 (max). The bottom of the boot for the new sewer main or lateral shall be set one inch above existing shelf unless otherwise indicated.

When used in a paved street, the ring and cover shall be set in suitable mortar surrounded by a concrete collar in accordance with Public Works Commission standard details. When used in places other than in a paved street, the ring and cover shall be set to the grade shown on the plans or directed by the Public Works Commission. In unpaved areas cam-lock ring and cover shall be used. Camlock ring and cover shall be installed in accordance with Public Works Commission standard details.

The interior manhole riser joints, lift holes and grade adjustment rings shall be sealed with non-shrinking mortar to provide a watertight manhole. Lift holes sealed by the manufacturer with plastic caps do not require mortar seal. The hardened mortar shall be smooth to rub with no sharp edges. Use of grade rings with cam-lock ring and cover are not allowed, unless approved by the PWC Project Coordinator. **Use of grade rings is not allowed for above grade adjustments**.

All exterior manhole riser joints, including the joint at the cone, shall be sealed with an external rubber sleeve. The sleeve shall be made of stretchable, self-shrinking rubber, with a minimum thickness of 30

mils. The back side of each wrap shall be coated with a cross-linked reinforced butyl adhesive. The butyl adhesive shall be a non-hardening sealant, with a minimum thickness of 30 mils. The seal shall be designed to stretch around the manhole joint and then overlap to create a fused bond between the rubber and butyl adhesive. The application shall form a continuous rubber seal for the life of the application. The sealing system shall be as manufactured by Concrete Sealants, Inc. (Con-Seal), Sealing Systems, Inc., or approved equal. The wrap shall be a minimum of six (6) inches in width, and shall be centered on the joint. All manhole joints (including the cone section to the last riser) shall be wrapped and sealed. Care shall be taken to prevent damage to the wrap during backfill operations. The manhole surface shall be prepared in accordance with manufacturer's specifications, prior to installing the joint wrap.

Materials shall not enter the sewer line during construction of the manhole. The manhole shall be kept clean of any and all debris or materials. Any debris or material that entered the manhole shall be immediately removed. This condition shall be maintained until final acceptance of the work.

CONNECTION TO EXISTING MANHOLES OR LIFT STATIONS

All connections to existing manholes and/or lift stations shall be approved by the Public Works Commission. Where new mains are to be connected to existing active sanitary sewers, the active sewers shall remain in service. Unless otherwise indicated, where new lines are connected into existing manholes, all or such portion of the manhole invert as is necessary shall be removed and a new invert shall be constructed to accommodate both new and existing flows. All work shall conform to the requirements specified for new manholes. The existing structure connection shall be cored and a flexible watertight connection (i.e., boot) installed. The boot shall be installed in accordance with Public Works Commission standard details and requirements. The Contractor shall coordinate and cooperate with the Public Works Commission's Project Coordinator.

PIPE TO MANHOLE CONNECTOR (BOOT)

A watertight, flexible pipe-to-manhole connector shall be utilized on all pipe to manhole connections, for both new and existing manholes and pipes, unless otherwise specifically authorized in writing by the Public Works Commission.

The connector assembly shall be the sole element to provide a watertight seal of the pipe to the manhole or other structure. The connector shall consist of a rubber gasket, an internal compression sleeve, and one or more external take-up clamps. The connector shall consist of natural or synthetic rubber and Series 300 non-magnetic stainless steel. No plastic components shall be allowed.

The rubber gasket shall be constructed of synthetic or natural rubber, and shall meet or exceed the requirements of ASTM C-923. The connector shall have a minimum tensile strength of 1,600 psi. The minimum cross-sectional thickness shall be 0.275 inches.

The internal expansion sleeve shall be comprised of Series 300 non-magnetic stainless steel. No welds shall be utilized in its construction.

Installation of the connector shall be performed utilizing a calibrated installation tool furnished by the connector manufacturer. Installation shall require no re-tightening after the initial installation. Installation shall be done in accordance with the manufacturer's instructions.

The external compression take-up clamps shall be Series 300 non-magnetic stainless steel. No welds shall be utilized in its construction. The clamps shall be installed utilizing a torque-setting wrench

furnished by the connector manufacturer. Installation shall be done in accordance with the manufacturer's instructions.

The Contractor shall utilize the proper size connector in accordance with the connector manufacturer's recommendations. All dead-end pipe stubs shall be restrained in accordance with ASTM C-923.

The finished connection shall provide a sealing to a minimum of 13 psi, and shall accommodate a minimum pipe deflection of seven (7) degrees without the loss of seal.

The pipe to manhole connector shall be PSX: Direct Drive as manufactured by Press-Seal, or approved equal.

INSIDE DROP MANHOLE STRUCTURE

Inside manhole drop structures shall be constructed and installed in accordance with Public Works Commission standard details.

CLEANING

Prior to final inspection, all sanitary sewer laterals, mains, and manholes newly installed on the collection system shall be flushed and cleaned. During the flushing operation, the downstream manhole shall be closed with a watertight plug to protect the existing sewer main. All water and debris shall be removed and properly disposed of by the Contractor. This condition shall be maintained until the Public Works Commission issues final acceptance for the project.

TESTING

Completed sewers shall be tested in accordance with the provisions outlined below. The Contractor shall furnish all equipment, labor, materials, and pay all costs associated with the tests performed. The Contractor shall schedule all testing with the Public Works Commission's Project Coordinator, a minimum of 48 hours in advance. The Contractor shall cooperate with the Public Works Commission's Project Coordinator and furnish any needed assistance necessary to complete the required testing.

For annexation and/or retrofit projects: No testing shall be conducted prior to successful completion of the compaction testing.

For all other projects: No testing shall be completed until all utilities are installed, prior to preparation of the road subgrade. The Contractor may elect to perform testing to satisfy them that the sewer utility is installed properly prior to commencing installation of other utilities. However, such testing shall not be construed as acceptance by PWC.

The deflection/mandrel test shall not be performed until a minimum of thirty (30) calendar days after backfill operations are completed and the area graded to final contours. In lieu of waiting thirty (30) calendar days, the Contractor has the option to have an independent testing laboratory verify that compaction has been completed to achieve the maximum density as shown in the detail. The location and elevation of the compaction testing shall be determined reviewed and approved by the Public Works Commission's Project Coordinator. The Contractor shall provide the Public Works Commission with a copy of the density testing results.

Compaction testing shall be done in accordance with Specification Section 02222 – Excavation and Backfilling for Utility Systems.

Vacuum Testing Manholes:

All precast sanitary sewer manholes installed by the Contractor shall be vacuum tested for leakage. This test shall be done in accordance with ASTM C-1244 and in the presence of a Public Works Commission Project Coordinator. The Contractor shall be responsible for providing all the necessary labor, materials, equipment, testing apparatus, and all other incidentals necessary to complete the vacuum test. All testing equipment utilized shall be approved for use in vacuum testing manholes.

Each manhole shall be tested after assembly. All lift holes shall be plugged with an approved non-shrink grout. All lines, including laterals, entering the manhole shall be temporarily plugged. The Contractor should take care to ensure that the pipes and plugs are secure in place to prevent them being drawn into the manhole. The test head shall be placed directly on top of the concrete surface of the manhole following the manufacturer's recommendations, rather than to the cast iron seating ring.

Manholes may be tested either prior to backfill or post backfill at the contractor's option. For pre-backfill testing, a vacuum of 10 inches of Mercury (inches Hg) shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of Mercury (inches Hg). The manhole is acceptable if the time for the vacuum reading to drop from 10 inches of Mercury to 9 inches of Mercury meets or exceeds the values indicated below:

	Diameter of Manhole		
Manhole Depth	**4' Diameter**	**5' Diameter**	**6' Diameter**
10' or less	**25 sec**	**33 sec**	**41 sec**
11' to 15'	**38 sec**	**49 sec**	**62 sec**
16' to 20'	**50 sec**	**65 sec**	**81 sec**
21' to 25'	**62 sec**	**82 sec**	**101 sec**
25' to 30'	**74 sec**	**98 sec**	**121 sec**

Vacuum testing backfilled manholes is not recommended in the presence of groundwater. Vacuum testing a backfilled manhole that is subjected to hydrostatic pressure may exceed the design limits of the flexible connecters and could lead to failure of the structure, joints, and/or connectors. Where groundwater is present a reduction in the vacuum pressure applied to the manhole will be required. The vacuum shall be reduced by 1 inch of Mercury for every 1 foot of hydrostatic head between 12 feet and 21 feet. A vacuum test should not be performed when the hydrostatic head exceeds 22 feet. See the chart below:

Hydrostatic Head (ft)*	12	13	14	15	16	17	18	19	20	21	22
Vacuum Pressure (in Hg)	10	9	8	7	6	5	4	3	2	1	**

*Hydrostatic head above the critical connector (critical connector is bottom most flexible connector)
**Do not perform vacuum test

If the manhole fails the initial test, the manhole shall be repaired by an approved method until a satisfactory test is obtained. All repair methods shall be approved by the Public Works Commission prior to being utilized. Retesting shall be performed until a satisfactory test is accomplished.

Mandrel Testing:

Deflection tests shall be performed on all PVC pipe installations. PVC pipe's maximum deflection after backfilling shall not exceed five (5) percent. The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on the type of pipe manufactured and the applicable ASTM Standard. The PVC pipe shall be measured in compliance with ASTM D2122 "Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings". The Contractor shall supply all labor, equipment and materials necessary to perform the test in the presence of the Public Works Commission's Project Coordinator. The test shall be performed without mechanical pulling devices. The mandrel shall be constructed so as to preclude any yield in diameter, and with a pull line on each end to facilitate withdrawal. If the deflection exceeds the allowable, the Contractor shall remove and replace the pipe.

Air Testing:

Air testing shall be performed on all mains and laterals to determine acceptability. The length of sewer subject to an air test shall be the distance between two adjacent manholes. The tests shall be conducted in accordance with the appropriate ASTM standard. The air test shall be coordinated with the Public Works Commission. The Contractor is required to supply all equipment, labor, materials and pay all costs associated with the test performed.

Air Test for PVC Pipe

The low pressure air test on PVC pipe shall be performed with satisfactory results in accordance with ASTM F1417 "Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air". The pipe, including lateral assemblies, shall be plugged and air added slowly until the internal pressure of the line is raised to 4.0 psi. After the pressure of 4.0 psi is obtained, regulate the air-supply so that the pressure is maintained between 3.5 and 4.0 psi for at least two (2) minutes, depending on air/ground temperature conditions. The pressure will drop slightly until equilibrium is obtained; however, a minimum of 3.5 psi is required. Once the 3.5 psi is maintained, the test will begin. If the pressure drops 1.0 psi within the time indicated below, the test fails.

Pipe Dia (in)	Minimum time (minutes)	Length for Min Time (ft)	Time for Longer Length (sec)
4	3:46	597	0.380L
6	5:40	398	0.854L
8	7:34	298	1.520L
10	9:26	239	2.374L
12	11:20	199	3.418L
15	14:10	159	5.342L
18	17:00	133	7.692L
21	19:50	114	10.470L
24	22:40	99	13.674L
27	25:30	88	17.306L
30	28:20	80	21.366L
33	31:10	72	25.852L

36	34:00	66	30.768L

The Contractor shall observe all safety precautions to include allowing no one in the manholes during testing, securing all plugs and providing additional plug bracing. The Contractor shall be required to furnish, install and remove after testing at no additional cost, a temporary glue cap/plug to be airtight for all cleanout stacks to accomplish air testing. The air pressure shall never exceed 8 psi. All gauges shall be accessible outside of the manholes.

HYDROSTATIC TESTS

After the ductile iron sewer pipe has been laid within the "protected" area and backfilled to finished grade, the pipe shall be subjected to a hydrostatic pressure test. All laterals within the “protected” area shall be ductile iron. All sewers subject to hydrostatic testing shall include (1) sewers entering or crossing streams, (2) sewers located less than 100 feet from any public or private water supply source including any WS-I waters or Class I or Class II impounded reservoirs, (3) where the minimum 18 inch vertical and 10 feet horizontal separation cannot be maintained between sewers and water mains (see NC DENR Regulations), or (4) as specified and/or indicated on the drawings. The Contractor will furnish all labor and material, including test pumps, plugs, and all other incidentals for making hydrostatic tests. Hydrostatic pressure testing shall be conducted on the completed main, including the laterals.

The duration of the pressure test shall be at least one hour or longer, as directed by the Public Works Commission. The hydrostatic pressure shall be 150 psi. Each section of pipe shall be slowly filled with water and the specified test pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Public Works Commission. Before applying the specified test pressure, all air shall be expelled from the pipe.

All joints showing visible leaks shall be made tight. Cracked or defective pipe, joints, laterals, and fittings discovered in consequence of the pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic test may be waived by the Public Works Commission in certain situations. The test shall be repeated until satisfactory to the Public Works Commission.

The results of the pressure tests shall be satisfactory as specified. All replacement, repair, or retesting shall be accomplished by the Contractor. All repairs shall be reviewed and approved by the Public Works Commission prior to backfill. The use of couplings, sleeves, etc. shall be reviewed and approved by the Public Works Commission prior to use.

END OF SECTION

DIVISION 2
SITE WORK

02750 WASTEWATER FLOW CONTROL

GENERAL

The intent and purpose of these specifications is to provide wastewater flow control, i.e., bypass pumping, of the sanitary sewer flows during the Contractor's operations. The Contractor shall furnish all labor, materials, accessories, equipment and tools for performing all operations required to bypass pump sewage around a manhole or sewer section in which work is to be performed.

The Contractor shall provide all pumps, piping, and other equipment to accomplish this task; perform all construction; obtain all permits; pay all costs; and perform complete restoration of all existing facilities to equal or better condition to the satisfaction of the Fayetteville Public Works Commission. The Contractor shall be responsible for the design, installation, operation, and maintenance of the temporary bypass pumping system. The Contractor shall provide sufficient documentation to the Fayetteville Public Works Commission to demonstrate that he, or his designated subcontractor, have the experience in the design, installation, and maintenance of temporary bypass pumping systems.

RELATED SECTIONS

A. Section 02305 – Pipe Bursting
B. Section 02500 – Traffic Control
C. Section 02730 – Sanitary Sewer System
D. Section 02760 – Television Inspection
E. Section 02766 – Sewer Line Cleaning
F. Section 02780 – Cured-in-Place Lining

REQUIREMENTS

The Contractor shall be responsible for all aspects of the bypass operation, including but not limited to: providing access to install, move, and maintain the pumps in the proper position, traffic control, installation and removal of bypass equipment, pump monitoring, testing of the bypass system, re-fueling, maintenance, notification of property owners (should access to private property be necessary), wastewater and fuel spill containment, and removal and replacement of manhole cones (if necessary). The bypass system (pumps and piping) shall be monitored by Contractor personnel at all times, when the bypass operation is in effect.

The Contractor shall have all materials and equipment on site to immediately respond to any emergencies or other event that could impact the bypass system (i.e., leak in the discharge piping, pump failure, flooding, etc.). The Contractor shall have sufficient support staff and equipment to mobilize to repair and/or service any equipment within one (1) hour of notification, 24 hours a day, seven (7) days a week. In the event of an emergency, the Contractor shall provide an immediate response and fully cooperate with the Fayetteville Public Works Commission.

The Contractor shall install the bypass pumps, equipment, and discharge lines to minimize impacts to the property owners, residents, and environment. *The Contractor shall be responsible for determining the best location for the bypass equipment, to include, but not limited to, the need for any special provisions to ensure access for the customers, preventing the pumps and manholes from flooding, etc. Such special provisions include, but are not limited to: installation of ramps, excavation and burial of the bypass lines, temporary*

fencing, sandbagging, construction of berms, raising the pumps, etc. The Contractor bears all responsibility for the maintenance and restoration of any trenches, ramps, access, etc. necessary for the temporary bypass pumping operation.

The Contractor shall take appropriate steps to ensure that all pumps, piping and hoses that carry raw sewage are protected from traffic. The Contractor shall identify the proposed methods to protect the temporary bypass pumping system from traffic as part of the detailed temporary bypass pumping plan. Traffic control shall be performed in accordance with these Contract Documents.

The bypass pumping system shall be monitored by Contractor personnel at all times (24 hours a day, 7 days a week), when the bypass operation is in effect. The Contractor's personnel shall be on-site at all times (24 hours a day, 7 days a week), and stationed at the primary bypass pumps. *Depending on the location and system set-up, it may be necessary for the Contractor to station personnel at each of the various bypass pump locations. Unless otherwise approved by the Fayetteville Public Works Commission, one (1) person cannot monitor multiple bypass pump locations. All bypass pumps, regardless of their location (primary or on secondary lines), shall be equipped with an automatic dialer (or other similar device).* The Contractor personnel shall immediately respond to any issue regarding the temporary bypass pumping system. All temporary bypass piping shall be periodically monitored (patrolled from pumps to discharge), but no less frequently than once every 12 hours. The bypass pumping equipment shall be automated and capable of functioning without the assistance of an operator.

SUBMITTALS

All submittals shall be provided in accordance with these Contract Documents, and the requirements outlined herein. The Contractor shall submit a detailed bypass pumping plan to the Fayetteville Public Works Commission for approval, prior to initiating the bypass operation. The Contractor shall submit this information far enough in advance to allow sufficient time to complete the necessary coordination, including but not limited to obtaining permits (i.e., encroachments), getting permission from property owners to cross and/or utilize their property, and gaining any necessary regulatory approvals. Failure to submit a complete and comprehensive bypass pumping plan in a timely manner shall not be cause for any extension of the Contract Time.

The detailed temporary bypass pumping plan shall include the following information:

- Method of monitoring the pumps to ensure proper operation, to include method of notifying personnel (Fayetteville Public Works Commission and Contractor) in the event of an emergency, activation of back-up pumps, etc.
- Method of monitoring upstream system levels to ensure surcharging does not result in back-ups into buildings, overflows, etc.
- The amount, if any, of any required surcharging.
- Method to initiate back-up pumps.
- Map showing general location of the pumps and bypass lines. This shall include means to maintain access to driveways, etc.
- Measures to secure the bypass system (lines, pumps, etc.) from traffic, vandalism, high stream flows, etc.
- Method of plugging (and securing the plug(s)) and type of plugs.
- Size and location of manholes or other access points for suction and discharge piping.
- Size of pipeline(s) or conveyance system(s) to be bypassed.
- Number, size, material, location, and method of installation of suction piping.
- Number, size, material, location, and method of installation of discharge piping.

- Bypass pump sizes, capacities, and number of each size to be provided on-site, including all primary, secondary, and spare pumping units.
- Calculations of static lift, friction losses, minimum inlet submergence, and flow velocity (pump curves showing pump operating range shall be submitted). Calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of North Carolina. *Calculations shall be provided for both the peak flow rate and a normal daily rate (see PUMPING AND BYPASSING section for sizing requirements).*
- Measures to protect discharge manhole(s) or structure(s) from erosion and damage due to the bypass operation.
- Erosion control measures.
- Emergency contact information for the personnel responsible for the pump operation.
- Emergency contact information for Contractor personnel to respond in the event of an emergency.
- List of available resources (equipment, materials, personnel) and contact information for emergency response.
- Method to contain potential releases of sewer flow from air release valves.
- Contingency plan for responding to potential sewer spills caused by weather, vandalism, acts of God, etc. The plan shall include communication protocols, available resources, and the steps to be taken in the event of an emergency.

No bypass operations shall proceed until all bypass submittals have been reviewed and approved by the Fayetteville Public Works Commission.

COORDINATION

The Contractor shall fully coordinate their temporary bypass pumping operations with the Fayetteville Public Works Commission. It is the Contractor's responsibility to fully determine the scope and location of the temporary bypass pumping system. As outlined in these Contract Documents, the Fayetteville Public Works Commission may provide assistance with the building and maintenance of access roads, clearing of easements, etc. All coordination (to include location of the pumps and discharge lines) shall be fully discussed and agreed to prior to commencement of bypass operations.

The Contractor shall schedule a coordination meeting with the Fayetteville Public Works Commission and other personnel (Contractor, bypass sub-contractor, etc.) a minimum of three (3) business days prior to starting the temporary bypass pumping system. The purpose of this coordination meeting is to ensure that the Contractor and their sub-contractors have a good understanding of the requirements and expectations of operating the temporary bypass pumping system, discuss contingency plans (to include protocols for emergency contacts), identify location(s) of pumps, verify necessary materials (repair sleeves, containment devices, etc.) are on-site and available, and any other items necessary to ensure that the Fayetteville Public Works Commission has confidence that the appropriate personnel can operate and maintain the temporary bypass pumping system. Should, for any reason, the Fayetteville Public Works Commission deem that the Contractor and/or their sub-contractor is not prepared to operate and maintain the temporary bypass pumping system, the temporary bypass pumping system shall not be started. The Contractor shall take all necessary steps to address any concerns to the satisfaction of the Fayetteville Public Works Commission. Upon completion of those actions, another coordination meeting shall be held, in order for the Fayetteville Public Works Commission to confirm that the Contractor and their sub-contractor is prepared to operate and maintain the temporary bypass pumping system. This process will be repeated until the Fayetteville Public Works Commission is satisfied that the Contractor and their sub-contractor are prepared to operate and maintain the temporary bypass pumping system. No additional contract time will be granted for this delay.

The temporary bypass pumping system shall run for a minimum of 24 hours, or longer as deemed by the Fayetteville Public Works Commission, prior to any activity occurring (cleaning, closed circuit television {CCTV}, etc.) within the main(s) being bypassed.

FLOW CONTROL PRECAUTIONS

Where the raw sewage flow will be blocked during the Work as a result of the temporary bypass pumping operation, the Contractor shall take all necessary precautions to protect the public health. No septic conditions shall be allowed due to Contractor's operations. The sewer system (mains, manholes, laterals, etc.) shall also be protected from damage. The following occurrences shall not be allowed:

1. No sewage shall be allowed to back up into any homes or buildings.
2. No sewage shall overflow any manholes, cleanouts or any other access to the sewers.
3. Users upstream of the project area shall be able to use all their water and sewer utilities without interruption or limitations.

If any of the above occur or are expected to occur, the Contractor shall take immediate action to alleviate one or all of the conditions. Additionally, the Contractor is required to observe the conditions upstream of the plug and be prepared to immediately increase bypass pumping or release the flows, as required. Any damage claims resulting from the Contractor's failure to properly maintain sewer flows shall be the Contractor's responsibility.

All sump pumps, bypass pumps, trash pumps or any other type pump which pulls sewage or any type of material out of the sanitary sewer system shall discharge into another sanitary sewer manhole, or appropriate vehicle or container acceptable to the Fayetteville Public Works Commission. Under no circumstances shall untreated sanitary sewer be discharged, stored or deposited on the ground, swale, road or open environment. The Contractor shall not allow any flow of sewage onto private property, streets, or into creeks and drainage systems. Damage due to negligence of the Contractor, including, but not limited to, flooded dwellings, damaged property, damaged driveways, etc., shall be corrected immediately by the Contractor at no additional cost to the Fayetteville Public Works Commission.

PLUGGING AND BLOCKING

In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. If this option is selected, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills or overflows occur.

A sewer line plug shall be inserted into the line at a manhole upstream from the section being surveyed or repaired. The plug shall be so designed that all or any portion of the operation flows can be released. The Contractor shall secure the plug, to prevent it from being dislodged and moving downstream. Flows shall be bypassed for the initial CCTV inspection and shall be bypassed throughout the duration of the work, to include the final CCTV inspection. Flows shall be bypassed in accordance with the approved temporary bypass pumping plan. Upon acceptance of the work by the Fayetteville Public Works Commission, the temporary bypass pumping system shall be removed and flows restored.

PUMPING AND BYPASSING

The Contractor, when and where required, shall divert sewer flows for the sewer pipe rehabilitation process, cleaning, television inspection, pipe repairs, manhole replacement and/or rehabilitation, obstruction removals,

or other related as required to complete the Work. The pumps and bypass lines shall be of adequate capacity and size to handle and prevent backup or overflow for all flows.

The temporary bypass pumping system shall be designed to maintain the flows necessary to meet the requirements of each particular location. *The temporary sewer bypass system shall have the capacity to handle the flows outlined in these Contract Documents. The temporary sewer bypass system shall be sized to handle 2.5 times the average daily flow rate, or the specified peak flow – whichever is greater.*

The Contractor shall be responsible for furnishing the necessary labor and supervision to set up, operate, and maintain the temporary bypass pumping system. A "set up" consists of the necessary pumps, conduits and other equipment to divert the flow of sewage, from the start to finish of work performed. *Each "set-up", regardless of location, shall have Contractor personnel on-site at all times (24 hours a day, 7 days a week) and stationed at the pumps, unless otherwise approved by the Fayetteville Public Works Commission*. The temporary bypass pumping system shall include:

- A minimum of one (1) redundant pump so that the temporary bypass pumping system is capable of transmitting the peak flow with the largest duty pump out of service.
- Pumps shall be provided with a means of automatic control via level sensing. Systems requiring manual starting and/or stopping shall not be allowed.
- All equipment (primary and secondary pumps) shall be equipped in a manner to keep noise to a maximum of 65 dBA at 30 feet.
- *An automatic dialer (or similar) to immediately notify (in a sequential operation) Contractor and Fayetteville Public Works Commission personnel in the event of equipment failure. The automatic dialer shall be set to issue notifications prior to flow level reaching critical elevations and having a spill occur. All bypass pumps (regardless of location) shall be equipped with an automatic dialer (or similar).*

The temporary bypass pumping system shall be provided in such a way as to maintain access for businesses and residences. The Contractor shall be responsible for determining the best location for the bypass equipment, and the need for any special provisions to ensure access for the residents and businesses. Such special provisions include, but are not limited to: installation of ramps, excavation and burial of the bypass lines, etc. The Contractor shall use bridges over the bypass lines, temporary lines under driveways, alternate routes, or other means to accomplish this item. The bypass plan submittal shall indicate the means of maintaining access. The Contractor bears all responsibility for the maintenance of any trenches, ramps, etc. necessary for the bypass operation.

Pumps, equipment, and bypass lines shall be continuously (24 hours a day, 7 days a week) monitored by on site Contractor personnel capable of starting, stopping, refueling and maintaining these pumps during the Work. The temporary bypass pumping system shall be provided with an automatic dialer (or other similar device) that will immediately notify (in a sequential operation) the Contractor and the Fayetteville Public Works Commission in the event of equipment failure. All bypass pumps (regardless of location) shall be equipped with an automatic dialer. This automatic dialer (or similar) shall be set to issue notifications prior to flow levels reaching critical elevations and having a spill occur.

The automatic dialer shall be set to issue notifications through a sequential operation. Automatic dialers that are not set up for sequential notifications shall not be acceptable. The Contractor's personnel shall be the first to receive any notifications from the automatic dialer. The automatic dialer shall only notify the PWC personnel after all Contractor notifications have been ignored and/or not responded to. The Contractor shall properly adjust the level at which the automatic dialer initiates notification to provide adequate time for the sequential notification to occur. If the PWC personnel are notified by the automatic dialer, the PWC

personnel shall assume that a spill is occurring or is imminent, and respond accordingly. The Contractor shall be responsible for all costs for the PWC to mobilize and respond to the notification, regardless if a spill occurred or not.

In some applications, it may be necessary to surcharge the system in order to ensure proper pump operation. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. In the event surcharging is necessary, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills occur.

All bypass piping shall successfully pass a hydrostatic test prior to bypassing the sewer flows. The hydrostatic test pressure shall be no less than the expected discharge pressures, and shall be held for a minimum of one (1) hour. All testing shall be observed by the Fayetteville Public Works Commission. Testing shall be coordinated with the Fayetteville Public Works Commission a minimum of 24 hours in advance.

SPILL RESPONSE

The Contractor shall not discharge or pump any sewage, solids, or debris on the ground, streets, storm water system, ditches, or streams. Any sewage spills shall be immediately reported to the Fayetteville Public Works Commission Water Resources Construction Department, (910) 223-4716. After normal business hours, the Contractor shall contact the Fayetteville Public Works Commission Dispatch Center, (910) 678-7400 or (910) 323-0178. The Contractor shall take complete responsibility for all costs related to the clean-up of the spill, including any fines issued by the North Carolina Department of Environmental Quality (NC DEQ).

In the event that raw sewage (in any quantity) is spilled, discharged, leaked or otherwise deposited in the open environment, due to the Contractor's work, the Contractor is responsible for any cleanup of solids and disinfection of the area affected. This work will be performed at the Contractor's expense with no additional cost to the Fayetteville Public Works Commission. The Contractor is also responsible for complying with any and all regulatory requirements in regards to the size spill with no additional cost to the Fayetteville Public Works Commission. The Contractor shall cooperate fully with the Fayetteville Public Works Commission and the applicable State agencies in responding to and cleaning up the spill. Any work completed by the Fayetteville Public Works Commission in responding to a spill caused by the Contractor's operations shall be billed to the Contractor.

Where sewage has backed up into a property due to any aspect of the Contractor's operation, the Contractor shall immediately notify the Fayetteville Public Works Commission, inspect the property with the Fayetteville Public Works Commission and agree on remedial measures. The Contractor shall be responsible for all cleaning, repair and/or replacement of damaged property, temporary relocation of all occupants of the affected properties, if required, all to the satisfaction of the property owner. These actions shall be undertaken immediately upon learning of the backup. Cleaning shall be performed by firms specializing in this type of work. All costs associated with the cleaning, repair, replacement of damages, occupant accommodations, insurance and spill remediation shall be borne by the Contractor. All remediation measures required as part of a spill response are part of acceptance of the project, and final payment shall not be made until such time all required measures are addressed and approved by the appropriate regulatory agency.

*** END OF SECTION ***

DIVISION 2
SITE WORK

02762 MANHOLE LINING – POLYMERIC

GENERAL

The Contractor shall furnish all labor, materials, equipment and incidentals required and install the monolithic polymeric manhole lining system and appurtenances as specified herein. The lining system shall be used to rehabilitate the interior of all designated existing sewer manholes as indicated within these Contract Documents and as shown on the Contract Drawings. The installed lining system shall withstand all loading conditions and hydrostatic pressure.

The manhole lining system shall consist of a cementitious base coat applied to the cleaned and prepared manhole surfaces, followed by the polymeric lining system. The Contractor shall furnish all necessary materials, labor, and equipment necessary to properly prepare the surfaces and apply the polymeric lining system as specified herein. The lining system shall be compatible with the applied chimney seal. The chimney seal shall be in accordance with these Contract Documents.

The Contractor is responsible for properly preparing the existing manhole for lining prior to the installation of the lining system, including stopping all leaks, flow control, patching voids, removing steps/manhole rungs, cleaning (to include water blasting), removing rubble, root removal, debris removal, etc.

The Contractor is advised that the presence or absence of any leakage through the manhole walls as seen in the Contractor's independent inspection prior to bidding is dependent upon the ground water levels and conditions at the time of the inspections. The Contractor shall reflect his/her assumptions and judgments on leakage through the manhole walls based on this information in the unit prices bid. All leakage shall be stopped prior to installing the lining system. No additional payment will be made to the Contractor for repairing leaks not visible prior to bidding.

Cleaning, surface preparation, lining application, and thicknesses shall be as specified herein and shall meet or exceed the lining manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, the Contractor shall comply with the manufacturer's minimum recommendations.

RELATED SECTIONS

A. Section 02500 – Traffic Control
B. Section 02730 – Sanitary Sewer System
C. Section 02750 – Wastewater Flow Control
D. Section 02765 – Manhole Chimney Seals

REFERENCE STANDARDS

This Section contains references to the governing standards and documents listed below. They are a part of this Section as specified and modified; the current version shall apply unless otherwise noted. In case of conflict between the requirements of this section and those of the listed documents, the more stringent of the requirements shall prevail.

A. American Concrete Institute (ACI)

a. ACI 224.1R – Causes, Evaluation and Repair of Cracks in Concrete Structures
b. ACI 301 – Specifications for Structural Concrete
c. ACI 308R – Guide to Curing Concrete
d. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
e. ACI 515 – A Guide to the use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
f. ACI 546.R – Concrete Repair Guide
g. ACI 546.3R – Guide for the Selection of Materials for the Repair of Concrete

B. ASTM International (ASTM)

a. ASTM C 868 – Standard Test Method for Chemical Resistance of Protective Linings
b. ASTM C 1583/1583M – Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
c. ASTM D 2794 – Standard Test Method for Resistance of Organic Linings to the Effects of Rapid Deformation (Impact)
d. ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Linings by the Taber Abraser
e. ASTM D 4285 – Standard Test Method for Indicating Water or Oil in Compressed Air
f. ASTM D 4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
g. ASTM D 4414 – Standard Practice for Measurement of Wet Film Thickness by Notch Gages
h. ASTM D 4541 - Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers
i. ASTM D 6944 Standard Test Method for Measuring Humidity with a Physchrometer
j. ASTM D 7682 – Standard Test Method for Replication and Measurement of Concrete Surface Profiles Using Replica Putty
k. ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
l. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
m. ASTM F 2414 – Standard Practice for Sealing Sewer Manholes Using Chemical Grouting
n. ASTM G 210 – Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus

C. International Concrete Repair Institute (ICRI)

a. Guideline No. 310.1R – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
b. Guideline No. 310.2 – Selecting and Specifying Concrete Surface Preparation for Sealer, Linings, and Polymer Overlays

D. National Association of Corrosion Engineers International (NACE)

a. NACE Publication 6D-173 – A Manual for Painter Safety
b. NACE SP0188 – Standard Practice for Discontinuity (Holiday) Testing of Protective Linings

c. NACE SP0892 – Standard Practice for Coatings and Linings over Concrete for Chemical Immersion and Containment Service
d. NACE No. 6/SSPC-SP13 – Surface Preparation of Concrete

E. Occupational Safety and Health Administration (OSHA)

a. Safety and Health Standards (29 CFR 1910/1926)

F. The Society for Protective Coatings (SSPC)

a. SSPC-SP13/NACE No. 6 – Surface Preparation of Concrete
b. SSPC-Guide 12 – Guide for Illumination of Industrial Painting Projects

G. Standard Practice for the Rapid Evaluation of Coatings and Linings by Severe Wastewater Analysis Test (S.W.A.T.)

Unless otherwise specified, references to documents shall mean the documents in effect at the time of receipt of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents or the last version of the document before it was discontinued.

In case of conflicting requirements between this specification and these referenced documents, the more stringent shall govern.

SUBMITTALS

Submit, in accordance with Section 01300 – Submittals and Section 01000 – Special Conditions, letters, shop drawings, and product data showing materials of construction, installation equipment and details of installation for the monolithic lining system including:

1. Product Data Sheets: Copies of current technical data for each component specified and applied as outlined in this Section.

2. Safety Data Sheets: Copies of current SDS for any materials brought on-site including all clean-up solvents, repair or resurfacing mortars and lining materials.

3. Qualification Data: Approved Installer Training Certificates from manufacturer.

4. Performance Testing Reports: Copies of test data for the entire physical, chemical, and permeation properties listed herein and as outlined within this Section.

5. Installation Instructions: Manufacturer's written installation instructions for the materials specified in this Section.

6. Construction Details: Copies of manufacturer's computer generated standard lining details for specified materials, including: leading edge termination, metal embedment in concrete, joint detail, wall-to-slab detail, pipe termination detail, and any other detail at the request of the Public Works Commission.

GUARANTEE

The installed lining system shall be guaranteed by the Contractor and Manufacturer for a period of five (5) years from the date of final acceptance. During this period, all defects discovered in the lining, as determined by the Public Works Commission, shall be repaired or replaced in a satisfactory manner by the Contractor at no cost to the Public Works Commission. All proposed repairs shall be submitted, reviewed, and approved by the Public Works Commission prior to the Contractor completing any work.

QUALITY ASSURANCE

The supplier shall be responsible for the provisions of all test requirements specified in the above referenced ASTM Standards as applicable. In addition, all lining products to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Public Works Commission. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of plant inspection of all lining products and materials approved for this Contract shall be borne by the Public Works Commission.

Inspections of the lining products and materials may also be made by the Public Works Commission after delivery. The lining products and materials shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though samples may have been accepted as satisfactory at the place of manufacture. Lining materials rejected after delivery shall be marked for identification and shall be removed from the job at once.

The Contractor shall initiate and enforce quality control procedures in accordance with the applicable ASTM, National Association of Corrosion Engineers (NACE), the Society for Protective Coatings (SSPC) standards, and in accordance with the manufacturer’s instructions.

Acceptable Manufacturers: A company with a minimum of five (5) years experience in manufacturing of, and providing technical service for chemical resistant systems equivalent to those specified herein.

The manufacturer of the lining system of manholes shall be a company that specializes in the design and manufacture of corrosion protection systems for manholes. The Contractor shall be completely trained in leak repair, surface preparation, installation of the lining system, and corrosion materials application on manholes. The lining system materials/products shall be suitable for installation in a severe hydrogen sulfide environment without any deterioration.

The applicator shall be trained and certified by the manufacturer for the handling, mixing, application and inspection of the manhole lining system as described herein.

DELIVERY, STORAGE AND HANDLING

Care shall be taken in shipping, handling and placing to avoid damaging the lining products. Extra care may be necessary during cold weather construction. Any lining product or material damaged in shipment shall be replaced as directed by the Public Works Commission.

Any lining product showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

While stored, the lining products shall be adequately packaged and protected. The lining products shall be stored in a manner as recommended by the manufacturer. The Contractor shall comply with the following:

1. Store the materials in sealed, original manufacturer's containers.
2. Store materials in a protected area out of direct sunlight.
3. Keep containers clean and undamaged.
4. Comply with manufacturer's published storage temperature and shelf life recommendations.
5. Protect all materials from freezing.

Deliver products to the job site in manufacturer's original, unopened containers bearing manufacturer's name and label and the following information

1. Product name.
2. Product description (generic product classification).
3. Manufacturer's lot number.
4. Color.

All materials shall be handled in accordance with their Safety Data Sheets (SDS) and the manufacturer's instructions.

PRODUCTS

The materials to be utilized in the lining of manholes shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. The manufacturer of corrosion protection products shall have a minimum of 10 years experience in the production of the lining products utilized and shall have satisfactory installation record. All rehabilitation products shall be manufactured by a single manufacturer, or the Contractor shall provide documentation that the materials are compatible with each other.

All lining materials shall be approved by U.S. EPA for sewer system rehabilitation.

The lining system shall be compatible with the thermal condition of the existing sewer manhole surfaces. Surface temperatures will range from 20^{o}F to 100^{o}F.

Any polymeric lining system that cannot provide test results of ASTM G 210 will not be approved for this application. (ASTM G 210– Standard Practice for Operating the Severe Wastewater Analysis Testing Apparatus).

The polymeric lining system shall provide a minimum service life of 50 years.

INFILTRATION CONTROL MATERIAL

Infiltration control materials shall be rapid-setting, high early strength, hand applied cementitious material for stopping infiltrating water and making repairs to concrete, brick or other masonry constructed manholes. The material shall be non-shrinking, non-metallic and non-corrosive. It shall be formulated at the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

1. Compressive strength (in accordance with ASTM C-109):
   - 1 hour 1,000 psi
   - 1 day 2,400 psi
   - 7 day 3,500 psi
   - 28 day 4,500 psi

2. Tensile strength (in accordance with ASTM C-109):
   - 1 day 175 psi
   - 7 day 250 psi
   - 28 day 350 psi

3. Bond Strength (in accordance with ASTM C-321)
   - 30 minutes 50 psi
   - 1 day 85 psi

4. Freeze-Thaw Durability (in accordance with ASTM C-666)
   - 100 cycles no loss

5. Set Time (in accordance with ASTM C-191-92)
   - Initial 30 to 60 seconds
   - Final 1 hour

6. Shrinkage (in accordance with ASTM C-157) – 0%

Infiltration control material shall be CEMTEC Hydraulic Cement by A.W. Cook Cement; Mainstay ML-10 by Madewell Products Corporation; PLS-505 by Protective Liner Systems; Quad-Plug by Quadex; or approved equal.

Chemical sealants or grouts used to seal active manhole leaks, to patch cracks, to fill voids and to otherwise prepare the manhole surfaces for the lining installation shall be suitable for the intended purpose and shall be compatible with the lining system as certified by the manufacturer.

All leaks shall be stopped prior to the installation of the lining system.

PATCHING MATERIAL

Voids in the existing manhole walls, benches, or damaged inverts must be repaired prior to installing the lining system. The patching material shall be a rapid setting, high early strength, corrosion resistant hand mixed and hand applied cementitious material intended for filling voids and repairing inverts in concrete, brick or other masonry constructed manholes. It shall be formulated in the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

1. Compressive strength (in accordance with ASTM C-109):
   - 1 day 3,500 psi
   - 7 day 4,900 psi
   - 28 day 5,500 psi

2. Tensile strength (in accordance with ASTM C-109):
   - 1 day 200 psi
   - 7 day 250 psi
   - 28 day 550 psi

3. Freeze-Thaw Durability (in accordance with ASTM C-666)
   - 100 cycles no loss

4. Set Time (in accordance with ASTM C-191-92)
   - Initial 15 to 20 minutes
   - Final 20 to 25 minutes

Patching material shall be CEMTEC Rapid Cure Vertical Grade by A.W. Cook Cement; Mainstay ML-72 by Madewell Products Corporation; Hyperform by Quadex; or approved equal.

All voids and other repairs shall be completed prior to the installation of the lining system.

CEMENTITIOUS BASE COAT

The cementitious base coat shall be a pumpable Portland based 100% pure calcium aluminate cement. The lining shall be installed via trowel or low-pressure application. The materials shall be suitable for all the specified design conditions.

The cementitious base coat shall be a system suitable for use as a trowel- or spray-applied monolithic surfacing in sewer manholes. The cementitious lining system shall be Mainstay ML-CA by Madewell Products Corporation; Aluminaliner by Quadex; CEMTEC Silatec CAM by A.W. Cook Cement; PLS-507 by Protective Liner Systems; or approved equal.

The cementitious base coat shall be applied to the following minimum total thicknesses for all lining systems:

1. **For block and cast concrete manholes in good condition, apply to a minimum thickness of one-half (0.5) inch.**
2. **For all brick manholes and for block or cast concrete manholes in poor condition, apply to a minimum thickness of one (1.0) inch.**

It is the Contractor's responsibility to determine the required thickness of the cementitious base coat, based on the manhole condition, groundwater conditions, etc. to ensure the long-term integrity of the installed lining system.

The cementitious base coat shall be installed on the walls of existing manholes, from the invert to the manhole frame, as further directed below. All cementitious lining shall be troweled to consolidate the material, and then brushed to provide a profile surface for application of the polymeric topcoat. The initial trowelling shall be done in an upward motion, to compress the material into voids. The Contractor shall ensure that the cement is not over-troweled. The cured cementitious base coat surface shall be continuous with proper sealing connections to all unsurfaced areas. The Contractor shall take all measures to ensure that the cementitious base coat properly cures. The use of curing compounds is prohibited.

The materials used in the cementitious base coat shall be mixed on site in accordance with the manufacturer's recommendations. Water shall only be added to the materials during the mixing process and prior to material pumping or spray application. No water shall be added at the nozzle.

The cementitious base coat, when cured, shall have the following minimum characteristics at 28 days as measured by the applicable ASTM standards referenced herein:

1. Density (when applied) – 135 pounds/cubic foot, plus/minus 5 pounds/cubic foot

2. Compressive strength (in accordance with ASTM C-109):
   1 day 2,800 psi
   28 day 8,000 psi

3. Bond Strength (in accordance with ASTM C-321)
   28 day 1,700 psi

4. Flexural Strength (in accordance with ASTM C-78)
   28 day 1,500 psi

5. Shrinkage (in accordance with ASTM C-157) – 0%

6. Freeze-Thaw Durability (in accordance with ASTM C-666)
   300 cycles no loss

The cured cementitious base coat shall be continuously bonded to all the brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the sewer manhole.

Where the manhole to be rehabilitated is subject to vehicular traffic, the cementitious lining shall be installed to no closer than one (1) inch below the bottom of the manhole frame so as to avoid transfer of impact loads to the new liner. Where the manhole to be rehabilitated is not subject to vehicular loads, the cementitious liner shall be continuous up to the manhole frame.

POLYMERIC LINING SYSTEM

Materials

The lining system top coat shall be a polymeric system suitable for use as a trowel- or spray-applied monolithic surfacing in sewer manholes. The polymeric lining system may be a two part 100% solids epoxy, epoxy mortar or polyurethane resin system. Accepted manufacturers are:

Epoxy Systems:	Mainstay DS-5 Epoxy by Madewell Products Corporation; PLS-614 by Protective Liner Systems; Raven 405 by Raven Lining Systems; Dura-Plate 5900 HB Epoxy by Sherwin-Williams; Dura-Plate 6100 HP Epoxy by Sherwin-Williams; or approved equal.
Epoxy Mortar:	Dura-Plate 5900 HB Epoxy Mortar by Sherwin-Williams; or approved equal.

Polyurethanes: Sher-Flex by Sherwin-Williams; or approved equal.

The lining system top coat shall be a 100% solids, epoxy polymer protective barrier material specifically designed to protect concrete and steel surfaces in severe wastewater environments, including associated abrasive physical attack and chemical attack from sewer gases and organic acids generated by microbial sources.

Epoxy lining shall be capable of achieving the specified thickness in a single coat application.

The polymeric top coat materials shall be applied by low pressure spray or hand applied to the minimum dry film thickness of 150 mils.

The polymeric materials shall be suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic and/or commercial sewage. The polymeric material shall be compatible with the cementitious base coat material, as per manufacturer's recommendations.

Installation

The polymeric lining system shall be installed over the cementitious base coat previously applied on the inverts, benches, and walls of the designated manholes. The polymeric liner shall be applied only after the cementitious base coat has properly cured, in accordance with the manufacturer's instructions.

The Contractor shall saw-cut the existing walls, benches, and/or inverts in order to "tie-in" the polymeric lining.

The cured surface of the polymeric lining system shall be smooth and continuous with proper sealing connections to all unsurfaced areas. The sprayed-on liner shall be troweled to consolidate the product into the profile of the substrate or resurfacing mortar.

When cured, the monolithic polymeric lining system shall form a continuous, tight-fitting, hard, impermeable surfacing which is suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage. The polymeric lining shall be continuously bonded to the cementitious base coat.

Where the manhole to be rehabilitated is subject to vehicular traffic, the polymeric lining system shall be installed to no closer than one (1) inch below the bottom of the manhole frame so as to avoid transfer of impact loads to the new liner. In those locations where the manhole is subject to vehicular traffic, a chimney seal shall be installed to "bridge" the gap between the manhole frame and the polymeric lining system. Where the manhole to be rehabilitated is not subject to vehicular loads, the polymeric lining system shall be continuous up to the manhole frame. **The polymeric lining system shall not be applied to the manhole frame.**

SPECTRASHIELD LINING SYSTEM

In addition to the above products and materials, the "Spectrashield" lining system as furnished by CCI Spectrum, Inc. is an approved equal. All products and materials for the "Spectrashield" lining system shall be in accordance with CCI Spectrum, Inc. requirements. Manhole preparation shall be in

accordance with the following:

- Stop all active leaks and infiltration utilizing an approved infiltration control material
- Patch all voids in the manhole utilizing an approved patching material
- Install the "Spectrashield" lining system to build back the manhole profile (the minimum thickness shall be **500 mills**)

All work shall be in accordance with these Contract Documents and as directed by the Public Works Commission.

INSTALLATION

GENERAL

All work shall be in accordance with these Contract Documents and as directed by the Public Works Commission.

The Contractor shall take appropriate action to comply with all local, state and federal regulations including those set forth by OSHA, EPA, the Public Works Commission and any other applicable authorities.

Prior to conducting any work, the Contractor shall perform an inspection of the structure to determine any need for protection against hazardous gases or oxygen depleted atmosphere and the need for flow control or flow diversion.

The Contractor shall clean each sewer manhole and shall properly dispose of any resulting material. The Contractor shall take sufficient precautions prevent any debris from their operations to enter the sewer system.

All surface washing, abrasive blasting, waterjetting, grinding, patching, filling and preparation shall be completed by the Contractor in accordance with the lining system manufacturer's recommendations.

The Contractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated that their service will be discontinued while the lining system is being installed, cured and active pipe and service connections reopened. The Contractor shall notify individual property owners at least 48 hours in advance, giving the date, start time and estimated completion time for the work being conducted.

Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment. Material shall not be applied during freezing weather conditions. No material shall be placed when the ambient air temperature is below 40^{o}F, or when the temperature is anticipated to fall below 32^{o}F in the next 24 hours.

Spray equipment shall be specifically designed to accurately ratio and apply the liner system.

SURFACE PREPARATION

Surface preparation methods may include high pressure water cleaning, hydro blasting, abrasive blasting,

grinding, detergent water cleaning, and shall be suited to provide a surface compatible for installation of the liner system. Remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings from all surfaces to be lined, including manhole walls, corbelling and manhole frame. The choice of surface preparation lies solely with the Contractor. The Contractor shall determine the required surface preparation method based upon the condition of the manhole, the presence of potential contaminants, access to perform the work, and the required condition of the surface to apply to specified lining system, as required by the manufacturer.

The surface preparation method shall produce a cleaned, abraded and sound surface with no evidence of laitance, loose concrete, brick or mortar, contaminants or debris, and shall display a surface profile suitable for application of the manhole lining system. The Contractor shall prepare the surface in accordance with the applicable NACE and/or SSPC recommendations for the specified lining system.

Coatings that cannot be removed shall be properly prepared (in accordance with these Specifications) to obtain and insure adequate bonding of the cementitious base coat material.

The Contractor shall conduct a visual inspection of each manhole after it is cleaned. All active infiltration leaks shall be plugged or sealed with an appropriate infiltration control material compatible with the cementitious base coat. The Contractor shall remove all loose mortar and rubble from existing walls, benches and inverts. Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be repaired utilizing non-shrink grout or approved alternative method. The Contractor shall prepare manhole to receive the cementitious base coat as necessary by reshaping and repairing benches, inverts, and walls where required. All interior surfaces shall be prepared as recommended by the base coat lining manufacturer. Minimum requirements are as listed below.

1. All cracks and other voids must be repaired and filled with suitable non-shrinking cements, sealants or grouts, including all voids between the existing sewer pipes and manhole walls. Patching compounds shall be compatible with the proposed lining system. All patches shall be smooth and even with the manhole wall.
2. All existing manhole rungs/steps shall be removed and the void patched or cut off and ground smooth.
3. All surfaces shall be suitably prepared for the required bonding of the cementitious base coat as recommended by the manufacturer.

Concrete surfaces to be coated shall be free of curing compounds and form release agents, laitance and foreign particles that may inhibit bonding. Prior to the start of the protective coating system application, the Contractor shall pre-clean as required, and inspect the substrate in accordance with SSPC-SP13/NACE No. 6, Severe Service. Surface preparation procedures shall be in accordance with NACE SP0892, SSPC-SP13/NACE No. 6 and ICRI Guideline No. 310.2. Surface preparation shall expose aggregate and obtain a uniform surface texture resembling the minimum recommended concrete surface ICRI-CSP profile. The Contractor shall remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings from all surfaces to be lined, including any metal work to be coated.

Existing Concrete Application: Existing concrete structures to receive the protective coating system must be capable of withstanding imposed loads. All oil, grease, waste and chemical contaminants shall be removed from the surface of the concrete prior to preparation in accordance with NACE SP0892 and SSPC-SP13/NACE No. 6. Concrete surfaces must be sound and capable of supporting the proposed polymeric lining system. Surface preparation requirement is to expose a sound, uniform surface texture

confirming to the minimum recommended ICRI-CSP. The appropriate cementitious repair mortar or epoxy cementitious repair material shall be applied to the entire, prepared surface to level surface suitable for coating.

Commencement of the Work of this Section shall indicate that the substrate and other conditions of installation are acceptable to the Contractor, and will produce a finished product meeting the requirements of these Contract Documents. All defects resulting from accepted conditions shall be corrected by Contractor at his own expense.

All concrete surfaces shall be prepared to a minimum of SSPC-SP13 prior to installation of the polymeric lining system.

Level or grind concrete substrates to produce a uniform and smooth surface, including removal of all sharp edges, ridges, form fins, and other concrete protrusions.

FLOW CONTROL

It is the intent of these Contract Documents that the Contractor will utilize flow-through plugs or other means to complete the manhole rehabilitation without the use of a temporary sewer bypass system. All temporary flow-through plugs shall be removed upon the completion of each step of the rehabilitation process (cementitious base coat, polymeric top coat). The Contractor shall be responsible for ensuring that their flow control system does not result in any sanitary sewer being discharged to the environment.

If required to properly complete the lining, the Contractor shall provide temporary bypass pumping of sewage flows where and when the rehabilitation work is being performed. The temporary bypass pumping shall be in accordance with Specification Section 02750 – Wastewater Flow Control and these Contract Documents.

INFILTRATION CONTROL

After surface cleaning, any visible leaks or infiltration shall be stopped, prior to installation of any patching material or the cementitious base coat. Infiltration and leaks shall be stopped utilizing hydraulic cement or other “typical” methods (i.e., oakum). It is the intent of these Contract Documents that the Contractor will take all necessary steps to stop all but the very large leaks without the use of chemical grout. Should a significant, very large leak be encountered that would require significant effort, large quantities of chemical grout, and/or other extreme measures, the method and cost to stop that leak shall be mutually agreed upon by the Contractor and the Public Works Commission, prior to commencing work.

A complete, watertight seal shall be provided at pipe and manhole wall connections. The Contractor shall submit details of how the watertight connections will be made to the Public Works Commission for review and approval.

REPAIR OF BENCHES AND INVERTS

The Contractor shall complete any necessary repairs to the bench and/or invert of the manhole, prior to installation of the specified lining system. All repairs shall be completed in accordance with the requirements of the Public Works Commission, and as outlined herein.

The invert channel shall be constructed of brick and mortar, in accordance with Public Works Commission standard details. The invert channel shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in direction of flow shall be made with a smooth curve as large as a radius as the size of the manhole will permit without a decrease in flow velocity. Changes in size and grade of the channel shall be made gradually and evenly. A shelf shall be provided on each side of any manhole invert channel. Inverts in manholes with standing water will not be acceptable.

CEMENTITIOUS BASE COAT

The Contractor shall furnish and place the cementitious base coat in each manhole as and where directed by the Public Works Commission. The installation of the cementitious base coat shall be in complete accordance with the manufacturers' specifications.

Prior to placing the cementitious base coat, the Public Works Commission and the Contractor must inspect and approve the surface preparation work. The Contractor shall notify the Public Works Commission when the manholes are ready for inspection. The Contractor is responsible for ensuring proper installation conditions including surface preparation, temperature, and moisture.

All bottom and horizontal surfaces shall have the cementitious base coat material applied to the required thickness by hand troweling or spray-on methods. All cementitious lining shall be troweled to consolidate the material, and then brushed to provide a profile surface for application of the polymeric topcoat. The initial troweling shall be done in an upward motion, to compress the material into voids.

All side vertical surfaces shall have the cementitious base coat applied to the required thickness in one pass or application. Non-vertical surfaces may be completed in multiple passes to prevent sloughing of material.

Temperature limitations must be handled as appropriate and as approved by the manufacturer.

POLYMERIC TOP COAT

The Contractor shall furnish and place the polymeric lining over the previously installed cementitious base coat and all other surfaces to be lined, and as may be directed by the Public Works Commission. The installation of the polymeric lining top coat shall be in complete accordance with the applicable provisions of the manufacturers' specifications.

The Contractor shall provide documentation that the mixing of materials is in accordance with the manufacturer’s instructions.

Prior to placing the top coat, the Public Works Commission and the Contractor must inspect and approve the cementitious base coat. The Contractor shall notify the Public Works Commission when the manholes are ready for inspection. The Contractor is responsible for ensuring proper installation conditions including cementitious base coat conditions, temperature and moisture.

The Contractor shall saw-cut the existing walls, benches, and/or inverts in order to “tie-in” the polymeric lining.

All surfaces shall have the monolithic polymeric lining applied by a spray-on method or by hand troweled applications in multiple passes to gradually build up to the required thickness.

Temperature limitations must be handled as appropriate and as approved by the manufacturer.

SPECTRASHIELD LINING SYSTEM

Installation of the "Spectrashield" lining system, as furnished by CCI Spectrum, Inc. shall be in accordance with the manufacturer's requirements. Manhole preparation shall be in accordance with the requirements outlined in these Contract Documents.

FIELD QUALITY CONTROL

The Contractor to perform the quality control procedures listed below in conjunction with the requirements of this Specification Section.

A. Inspect all materials upon receipt to ensure that all are supplied by the approved Manufacturer.

B. Surface pH Testing: The pH of the concrete substrate will be measured using pH indicating papers. The pH testing is to be performed once every 50 square feet. Acceptable pH values shall be a minimum 9.0 as measured using color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Check Jumbo 1-12, or approved equal. The paper shall be touched to the surface once using moderate gloved finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH. Spot check any questionable areas with a 1% phenolphthalein solution. The phenolphthalein solution shall turn bright pink on concrete.

TESTING

During application of the polymeric top coat, the Contractor shall measure the thickness and uniformity of the material by the use of a wet film thickness gage meeting the requirements of ASTM D 4414. Measurements shall be completed in the presence of the Public Works Commission. The Contractor shall document all measurements for each manhole and submit the documentation to the Public Works Commission. The documentation shall be submitted with each pay application.

Field acceptance of the manhole lining system shall be based on the Public Works Commission's evaluation of the appropriate installation of the base coat and top coat per field inspections and on observation of the measurements of the wet film thickness. Acceptance shall also be based on the Public Works Commission's evaluation of the curing test data and final testing.

The polymeric lining top coat shall provide a continuous monolithic surfacing with uniform thickness throughout the manhole interior and be free of pinholes, slumps and drips. A visual inspection shall be conducted to ensure that no pinholes are in the monolithic coating. The visual inspection shall include terminations and transitions of the polymeric liner.

Once the lining system has fully cured, it shall be checked via high voltage spark detection, in accordance with NACE SP0188 and the manufacturer's instructions. All defects shall be corrected at no cost to the

Public Works Commission. The high voltage spark detection shall be done in accordance with:

1. The manhole environment shall be properly vented prior to testing to ensure hazardous conditions do not exist.
2. The high voltage spark detection equipment shall be set at 100 volts per one (1) mil of of applied film thickness, or as recommended by the manufacturer.
3. All detected holidays shall be marked and the area of the liner shall be repaired. The surface area around the defect in the liner shall first be abraded using an appropriate grit paper or other hand abrasion tool. After abrading and cleaning the area, the area shall be patched by hand application of the polymeric lining topcoat material. All repair procedures shall follow manufacturer's recommended procedures.
4. All repaired areas shall be spark tested.

The Contractor is expected to perform preliminary spark testing prior to scheduling a final test with the Public Works Commission. Any defects noted during this preliminary testing shall be repaired in accordance with these specifications and the manufacturer's recommended procedures.

ACCEPTANCE

The Public Works Commission shall complete a final inspection of each manhole, to include a visual inspection to verify that no leakage through the manhole wall is occurring, the manhole has been rehabilitated in accordance with the Contract Documents, and witness the final spark test. The Public Works Commission shall visually inspect every manhole and shall observe the final spark testing for every manhole. The Contractor shall coordinate with the Public Works Commission to schedule the final inspection. Any deficiencies noted during the final inspection shall be repaired in accordance with these specifications and the manufacturer's recommended procedures.

Inspection by the Public Works Commission does not absolve the Contractor from their responsibility for quality control inspection and testing as specified in these Contract Documents or as required by the manufacturer's instructions.

There shall be no groundwater infiltration or other leakage through the manhole wall after it has been lined. If leakage is found, it shall be eliminated with an appropriate method as recommended by the liner manufacturer and approved by the Public Works Commission. Any leakage shall be sealed utilizing materials compatible with the lining system, in accordance with the manufacturer's directions, and as approved by the Public Works Commission. The repair materials shall have the same life expectancy of the installed lining system. All repair materials shall be properly cured in accordance with the manufacturer's instructions. The use of curing compounds is prohibited.

All pipe connections shall be open and clear.

There shall be no cracks, voids, pinholes, slumps, drips, uncured spots, dry spots, lifts, delaminations or other type defects in the lining. The polymeric lining shall provide a continuous monolithic surface with uniform thickness throughout the manhole.

If any defective lining is discovered after it has been installed, it shall be repaired or replaced in accordance with the manufacturer's recommendations and in a satisfactory manner to the Public Works Commission. This requirement shall apply for the entire guarantee period.

The Contractor shall demonstrate that the installed lining system does not interfere with the proper sealing and locking (as applicable) of the manhole cover. Upon completion of the spark testing, all manholes shall be locked (if so equipped). For those manholes within paved areas, the Contractor shall apply four (4) dollops of roofing tar to the frame, to eliminate the cover from rattling. The dollops shall be equally spaced around the frame. The Public Works Commission Project Coordinator shall verify that the manholes are secured (locked and/or tarred).

At the completion of the Work, the Contractor shall remove all materials and debris associated with the Work of this Section.

The Contractor shall clean all surfaces not designated to receive the specified lining system. The Contractor shall restore all other work in a manner acceptable to the Public Works Commission.

The installed lining system shall be protected from damage until Final Acceptance of the Work. Any damage to the installed lining system shall be repaired or replaced at the discretion of the Public Works Commission, at no additional cost to the Public Works Commission.

*** END OF SECTION ***

02766 SEWER LINE CLEANING

GENERAL

The intent and purpose of this specification is clean and videos all sewer segments to be rehabilitated. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to clean all sewer pipe and fittings for each of the identified segments. The cleaning shall be completed prior to the pre-rehabilitation video.

All cleaning shall include the proper high-pressure water jetting, rodding, bucketing, brushing, and flushing of sewers and manholes prior to inspection by closed circuit television, pipeline rehabilitation, and testing operations.

Cleaning shall dislodge, transport, and remove all sludge, mud, sand, gravel, rocks, bricks, grease, roots, sticks, and other debris from the interior of the sewer pipe. The pipe shall be cleaned in such a manner as to ensure the success of the rehabilitation method.

All cleaning operations, as outlined above, shall be included in the Contractor's unit price bid for Sewer Line Cleaning.

RELATED SECTIONS

A. Section 02730 – Sanitary Sewer System

EQUIPMENT

A. Hydraulically Propelled Sewer Cleaning Equipment

a. Hydraulically propelled sewer cleaning equipment shall be the movable dam type, constructed such that a portion of the dam may be collapsed during cleaning to prevent flooding of the sewer.
b. The movable dam shall be same diameter as the pipe being cleaned and shall provide a flexible scraper around the outer periphery to ensure total removal of grease.
c. The Contractor shall take precautions against flooding prior to using sewer cleaning balls or other such equipment that cannot be collapsed instantly.

B. High Velocity Hydro-Cleaning Equipment

High velocity hydro-cleaning equipment shall have the following:

a. A minimum of 800 feet of high-pressure hose.
b. Two or more high velocity nozzles capable of producing a scouring action from 15 to 45 degrees in all size lines being cleaned.
c. A high velocity gun for washing and scouring manhole walls and inverts.
d. Capability of producing flows from a fine spray to a long distance solid stream.
e. A water tank, auxiliary engines and pumps, and a hydraulically driven hose reel.
f. Equipment operating controls located above ground.

C. Mechanical Cleaning Equipment

All mechanical cleaning equipment shall be either power buckets or power rodders by the Flexible Tool Division of Rockwell Manufacturing Co, or approved equal.

a. Bucket Machines
    i. Bucket machines shall be furnished with buckets in pairs and with sufficient dragging power to perform the work efficiently.
    ii. Shall use V-belts for power transmission or have an overload device. No direct drive machines will be allowed.
    iii. Shall be equipped with a take up drum and a minimum of 500 feet of cable.
b. Power Rodding Machines
    i. Shall be either sectional or continuous.
    ii. Shall hold a minimum of 750 feet of rod.
    iii. Shall have a rod of specifically treated steel.
    iv. The machine shall be fully enclosed and have an automatic safety throw out clutch.

PERFORMANCE

A. The Contractor shall utilize properly selected equipment to remove all rocks, dirt, grease, roots, and other deleterious materials and obstructions.
B. Protect existing sewer lines from damage caused by improper use of cleaning equipment.
C. The Contractor shall take all necessary precautions to avoid damage or flooding to public and/or private property being served by the line(s) being cleaned.
D. The Contractor shall utilize the existing sewage flow in the sewer line to provide the necessary pressures for hydraulic cleaning devices whenever possible.
E. Removal of Materials -
    a. Remove all solids and semi-solids at the downstream manhole of the section being cleaned.
    b. Passing of material from one section to the next downstream section will not be permitted.
F. The Contractor is to remove all materials from the site and properly dispose of all solids and semi-solids recovered during the cleaning operation.
G. No sewer cleaning shall take place in a particular sewer segment until all upstream pipe segments have been cleaned. If cleaning is done in a downstream pipe segment in order to facilitate overall cleaning operations, that segment shall be re-cleaned at no additional cost to the Owner, after all pipes upstream of that segment have been cleaned.

02931 SOD

GENERAL

Restoration of existing lawn areas outside of the public right-of-way disturbed by construction activities shall be by installation of new sod. Restoration and sod shall be performed as soon as practical, but the time period between initial disturbance, the utility installation and sod placement shall not exceed 60 days. Sod is defined as blocks, squares, strips of turf grass and adhering soil used for vegetative planting. Sodding and preparation of the sod bed shall be performed by an experienced landscape subcontractor specializing in this type of operation unless otherwise approved by the Public Works Commission in writing.

The Contractor shall adhere to the standards set forth by the American Association of Nurseryman and the Associated Landscape Contractors of America. All personnel shall be appropriately trained with regard to the degree of involvement so to assure the Public Works Commission the highest level of workmanship. Sod species suitable in this area are hybrid bermuda, centipede and zoysia; however the sod placed for each individual's lawn shall be the same species of sod as existing. Sodding may be performed at any time of the year except frozen sod shall not be placed nor shall sod be placed on frozen ground. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth of a vigorous, disease free and weed free sod lawn.

MATERIAL

Materials, equipment and products incorporated in the work shall be approved by the Public Works Commission. The Contractor shall submit a list of the proposed materials with samples, if required. Package materials should be delivered in unopened original containers showing weight, analysis and name of manufacturer. The Contractor shall protect the material from deterioration and/or damage

Sod shall contain 95 percent permanent grass; not more than five (5) percent weeds and undesirable grasses, good texture and free from obnoxious grasses, roots, stones and foreign materials. Sod shall be uniformly 1 ½ to 2 inches thick with a well-developed fibrous root mat system in topsoil with clean cut edges. The sod shall be sufficiently dense and cut to the minimum required thickness such that if the sod is suspended by one corner, the sod will not tear apart. The sod shall be recently mowed to a height of not more than three (3) inches prior to harvest. The sod shall be supplied and maintained in a healthy condition as evidence by the grass being a normal green color in appearance, dense, and free from insects, pests, disease or injury. Sod shall be delivered to the job site within 24 hours after being cut and shall be installed within 24 hours after delivery. Any sod which is torn, broken or too dry will be rejected.

SOIL BED PREPARATION

Before landscape construction is to begin, the site shall be cleaned and disposed of brush, rubbish, stones, gravel and other foreign material within the area to be landscaped. Exposed ground surfaces disturbed during construction activities shall be graded to the original contours (allowing for the thickness of the sod) or as in the case of an altered contour such as a fill slope, graded as directed by the Public Works Commission to finish grade, or typical cross section. The sod bed shall be excavated to such a depth that after sod placement the top of the sod shall be flush with surrounding grade or contours. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges or depressions. Do not start work until conditions are satisfactory and do not work during inclement or impending inclement weather.

The surface area to receive sod shall contain a minimum of four (4) inches of good, fertile, friable,

organic natural topsoil loam as a base for laying the sod. Topsoil shall be free of clumps, brush, sticks, weeds, stones, roots, trash or other objectionable material. Contractor shall insure all topsoil to be free of plants or plant parts of quackgrass, johnson grass, nut sedge, poison ivy or other noxious weeds. The Contractor shall furnish and supplement the existing topsoil at no additional costs to the Public Works Commission providing a minimum four (4) inch thickness as specified. Soil preparation shall not be performed in frozen or extremely wet conditions. The finished topsoil bed shall be uniform in grade, with a yard like appearance. All changes in grade shall have a smooth, rounded peaks and valleys.

The soil shall be scarified or otherwise loosened to a depth of not less than five (5) inches and all clods shall be broken. The top four (4) inches shall be worked into an acceptable smooth, friable and uniformly fine texture sod bed by use of soil pulverizes, drags, harrows or by other methods approved by the Public Works Commission. Commercial grade fertilizer (8% nitrogen, 8% phosphate, 8% potash) shall be applied at a rate of 20 pounds per 100 square feet, super-phosphate at 12 pounds per 1,000 square feet and lime (dolomite limestone containing not less than 85% total carbamates) shall be applied at a rate of 25 pounds per 1,000 square feet or at a rate recommended for the type of sod being placed. Apply soil amendments within 24 hours after raking topsoil base surface and not more than 48 hours prior to laying sod. Mix thoroughly a minimum depth into the upper four (4) inches of topsoil and lightly water to aid in dissipation. Sod placement shall not begin until the soil preparation is inspected and approved by the Public Works Commission. During application of soil amendment fertilizer etc., adequate precautions shall be taken to prevent damage to existing features such as traffic, structures, landscape, trees, vegetation, utilities or any other appurtenances. The Contractor shall be required to repair or clean any damages.

PLACING SOD

The Contractor and his landscape subcontractor shall coordinate the placing of the sod to begin within 24 hours after the topsoil base preparation is completed and accepted by the Public Works Commission. Sod shall be brought to the site as near to the time of placing as possible. Store sod in the shade, and keep watered particularly in extreme hot and dry condition to insure vitality and to prevent the dropping off of soil during handling. During wet weather, the sod shall be allowed to dry sufficiently to prevent tearing. Handling shall be done in a manner which will prevent tearing, breaking, drying or other damage. Carefully place sod in rows with the longer side perpendicular to slopes and the ends staggered in each successive row in a brick-like pattern. Butt the ends and sides together tightly and do not overlap or stretch the sod. Do not leave any voids or gaps. Unavoidable gaps shall be closed with small pieces of torn or broken sod if kept moist and approved by the Public Works Commission. After the sod is laid, irrigate thoroughly to allow water to penetrate a minimum six (6) inches into the soil below the sod. Sod shall not be placed when the atmospheric temperature is below 32^{o}F.

Tamp and roll completed sod installation with a manual roller or approved equipment to eliminate minor irregularities and to form close contact with the soil bed immediately after placing and watering. The type of rolling and tamping equipment to be used shall be submitted to the Public Works Commission for approval prior to construction. On steep slopes 3:1 (horizontal and vertical) or greater, in drainage ditches or any areas where sod slipping may occur, anchor sod with approved wooden stakes (½"x ¾" x 12") or staples spaced not over two (2) feet apart in any direction and/or in sufficient number to prevent slippage or displacement. The anchors shall be driven flush with the surface of the sod. The wide flat side of the stake shall be driven parallel to the slope. Staking shall be done concurrently with sod placement and prior to tamping. Sod shall be laid with the long horizontal edge of the strips parallel to the contour starting at the bottom of the slope. The edge of the sod shall be turned slightly in the ground at the top of a slope and a layer of earth placed over it and compacted so as to conduct the surface water over and onto the top of the sod. Upon completion of the above described work, the surface of the sodded areas shall coincide with the finished grade and not exceed ¼" plus or minus variation to adjoining grade or proposed

contour. Extreme care shall be taken to prevent the installed sod from being torn or displaced.

MAINTENANCE

The Contractor shall, at no additional cost to the Public Works Commission, make whatever arrangements necessary to supply water of suitable quality and purity to sustain and encourage vigorous plant growth, and supply all equipment for proper delivery and application to planted areas. Water obtained from a PWC fire hydrant shall be metered and properly protected with an approved backflow prevention device. PWC must inspect and approved any connections to their water system to include the proposed water application and storage equipment. The Contractor shall not use private resident's water. The Contractor is solely responsible to provide watering of the sod. The method of application of water shall be approved by the Public Works Commission. Limit watering to early morning or late afternoon to enable to soil the absorb maximum amount of water.

Maintenance shall begin immediately after sodding operation. The Contractor shall maintain all sodded areas until sod is firmly established and as outlined below. Maintenance will include watering, fertilizer, pest control, soil amendments, disease control, erosion repair, mowing, protecting turf area from traffic (i.e. temporary fences, barriers, signs, etc.) and replacement of any dead or damaged sod.

Watering

- Water lawn areas once a day with a minimum ½ inch water for the first three (3) weeks after area sodded.
- After the three (3) week period, water twice a week with a ¾ inch of water each time unless a comparable amount of rainfall has occurred.
- Make weekly inspections to determine moisture content of soil and supplement the above watering schedule as needed.
- Excessive runoff puddling and wilting shall be prevented.

Fertilizer and Pest Control

- Evenly spread fertilizer composite at a rate of 40 pounds per 5,000 square feet or as recommended by the manufacturer. Fertilizer shall not be applied until two (2) weeks after initial placement of the sod or prior to the advent of winter dormancy.
- Treat areas of weed and insect infestation as recommended by the treatment manufacturer.

Mowing

- The Contractor shall do mowing operations, (in yards not being mowed by residents) until provisional acceptance.
- Mowing shall be done only when the grass is dry with a rotary type mower having a blade height set not lower than one and one half (1½) inches nor higher than three (3) inches.
- Mowing operations shall be conducted at intervals, which ensure grass height does not exceed four (4) inches between mowing.
- The Contractor shall complete at least one mowing operation before the work will be considered for acceptance.

The Contractor shall protect and not allow access of vehicular traffic into any newly sodded areas and shall repair any damaged turf to original grade. Maintenance shall continue for a period of 90 days after placement or until provisional acceptance by the Public Works Commission. A written record shall be furnished to the Owner of the maintenance work performed. At least two weeks shall elapse after chemical control is applied before a request of inspection.

ACCEPTANCE

Fifteen (15) days prior to the end of the 90 day maintenance period, the Contractor shall make a written request to the Public Works Commission for an inspection and provisional acceptance of the sod. Failure to notify the Public Works Commission will not relieve the Contractor of the maintenance provisions required and the Contractor will continue to be responsible for the maintenance of the sod.

Replacement of dead sod shall be performed within seven (7) days after notification by the Public Works Commission and the maintenance period for these areas or individual lawns shall be extended for the 90 day maintenance period. Failure to replace dead sod within the specified seven (7) day period will result in the Public Works Commission having the work performed and deducting the cost from the Contract; however, the Contractor shall be responsible for the maintenance.

Final acceptance will be given upon satisfactory contract performance exhibited at final inspection and acceptance. Sodded areas are to be fully rooted prior to acceptance. The Owner shall be the sole judge as to whether or not the lawns are acceptable. Should any deficiencies be disclosed at final inspection, the Contractor shall make the necessary corrections in a timely manner and request re-inspection.

GUARANTEE

The Contractor shall guarantee a dense, vigorous stand of turf free of weeds, disease, pests or any dead areas more than one half of a square foot in size for a period of 90 days from initial placement or replacement whichever is greater. Total dead area shall not exceed one percent (1%) of total square footage for each individual resident's lawn.

02933 LAWNS AND GRASSES (SEEDING)

GENERAL

All exposed ground surfaces that have been disturbed during construction shall be graded to original contours as practicable, shaped to drain, and free of trash and debris. Grassing shall be accomplished as soon as practicable after sections of work are completed. Seeding and/or planting shall be performed by an experienced subcontractor specializing in this type of operation, unless otherwise approved by the Public Works Commission in writing. Disturbed sections shall not exceed one mile, without prior approval by the Public Works Commission. Grassing shall be in accordance with the Contract Documents.

PREPARATION OF THE SOIL

The surface area to receive seed shall contain a minimum of four (4) inches of good, fertile, friable, organic natural topsoil loam as a base for spreading the seed. Topsoil shall be free of clumps, brush, sticks, weeds, stones, roots, trash or other objectionable material. Contractor shall insure all topsoil to be free of plants or plant parts of quackgrass, johnson grass, nut sedge, poison ivy or other noxious weeds. The Contractor shall furnish and supplement the existing topsoil at no additional costs to the Public Works Commission providing a minimum 4 inch thickness as specified. Soil preparation shall not be performed in frozen or extremely wet conditions. The finished topsoil bed shall be uniform in grade, with a yard like appearance. All changes in grade shall have a smooth, rounded peaks and valleys.

The topsoil shall be loosened and mixed to the depth of four inches (4"). Suitable equipment (cultipackers, harrows, drags) meeting the approval of the Public Works Commission shall be used. This operation shall be accomplished by cutting on one (1) foot centers parallel to the contour of the slopes. On slopes that are steeper than 2:1, both depth preparation and degree of smoothness may be reduced, if approved by the Public Works Commission, but in all cases the slope surface shall be scarified groove, trenched or punctured so as to provide a textural plane of cut forming pockets, ridges, or trenches in which seeding material can lodge. Soil preparation shall not be performed when the soil is frozen, extremely wet or in an otherwise unfavorable working condition. The soil shall be free of any substance that might inhibit plant growth. Assistance of the local agricultural agent is recommended.

Lime shall be applied at the rate of 1/2 tons per acre. 10-20-20 commercial fertilizer shall be applied at the rate of 1,000 pounds per acre and well worked in to the top four inches (4”) of top soil. If hydroseeding, use 500 pounds of 10-10-10 fertilizer on slopes steeper than 1/2 horizontal to 1 vertical.

SEED MIXTURE AND SOWING THE SEED

Seed shall be seed certified to be the latest season's crop and shall be delivered in original sealed packages bearing the producer's guaranteed analysis for percentages of mixtures and pure live seed. The producer's seed label shall indicate it the minimum percent of pure live seed (which shall be 82.45 for Bermuda, 88 for Rye Grain), the minimum percent of germination in hard seed and maximum percent of weed seed (no more than 1 percent for Bermuda, 0.5 percent for Rye Grain). Seed shall be labeled in conformance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable State seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable.

The following seed mixture shall be used:

POUNDS OF SEED PER ACRE

	K-31 Fescue	Grain Rye	Common Bermuda	Centipede
April 15 - Sept. 1	75	-	60 (hulled)	5
Aug. 15 - Nov. 15	120	-	25 (hulled)	5
Nov. 1 - April 1	120	120	25 (un-hulled)	5

Note: If there are differences in the seed mixture between the mixture stated in these specifications and that which is specified as part of an approved Erosion Control Plan, the seed mixture specified in the erosion control plan shall take precedence.

Where construction crosses a pasture that has been grassed, the Contractor shall re-seed the area with the same type of grass as found on the site. All highway rights-of-way, and private yards disturbed shall also be re-seeded or with the same type of grass previously found. The seed mixture specification shall be used as a guide and the Contractor is charged with the responsibility of seeding areas with the proper type of grass that matches the existing.

Seed shall be broadcast uniformly by hand or by approved sowing equipment. One half of the seed shall be sown in one direction and the remaining shall be sown at right angles to the first. Do not seed when the wind velocity exceeds five (5) miles per hour. Rake lightly into top 1/8 inch of the soil prior to compacting, with a roller not exceeding 100 pounds.

All seeded areas will be mulched with two (2) tons per acre of small grain straw or wood cellulose fiber spread uniformly, approximately 1/4 of ground should be visible to avoid smothering seedlings. Asphalt emulsion (ASTM D-977 and ASTM D-2028) shall be used to anchor the straw applied at 150 gallons per ton of straw, or crimped to stabilize. Asphalt emulsion shall be required from November 1st to March 31st. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water or other causes and promptly remove any blockage which may occur.

SPECIAL CONSIDERATIONS

Shrubbery shall be expertly removed and carefully preserved for replanting, unless otherwise directed by the Public Works Commission adequate earth ball shall be removed to guard against damage to the root system. Shrubbery shall be replanted only after all construction is complete. The excavation made for replanting shall be six inches (6”) larger in every dimension than the root ball removed. This additional space shall be filled with a mixture of one half topsoil and one half peat moss. Care shall be taken to set the top of the ball slightly above or flush with the surrounding surface. Any shrubbery damaged or that dies shall be replaced with an equal or better plant material at the Contractor’s expense.

MAINTENANCE

The Contractor shall protect and maintain grassed areas as necessary to establish a uniform turf composed of the grasses specified. The Contractor shall re-seed any bare areas and repair all eroded areas.

Watering of seeded areas will be required during periods of dry weather to promote maximum growth. The Contractor shall supplement natural rainfall to insure a minimum of one (1) inch of rainfall weekly.

Maintenance of lawns begins immediately after the area is planted and continues for the period required to establish acceptable lawns, but not less than sixty (60) days after initial seeding, or until provisional acceptance by Owner. Maintain seeded areas by watering, fertilizing, mowing, weeding and other operations such as rolling, re-grading, replanting, aerating, and mulching as required to establish an acceptable lawn free of eroded or bare areas.

ACCEPTANCE

Fifteen (15) days prior to the end of the sixty (60) day maintenance period, the Contractor shall make a written request to the Owner for an inspection and provisional acceptance of the seeded area. Failure to notify the Owner will not relieve the Contractor of the maintenance provisions required and the Contractor will continue to be responsible for the maintenance of the seeded area.

Replacement of dead seed area(s) shall be performed within seven (7) days after notification by the Public Works Commission and the maintenance period for these areas or individual lawns shall be extended for an additional sixty (60) day maintenance period. Failure to replace seeded area(s) within the specified seven (7) day period will result in the Owner having the work performed and deducting the cost from the Contract; however, the Contractor shall be responsible for the maintenance.

Final acceptance will be given upon satisfactory contract performance exhibited at final inspection and acceptance. Seeded areas are to be fully rooted prior to acceptance. The Owner shall be the sole judge as to whether or not the lawns are acceptable. Should any deficiencies be disclosed at final inspection, the Contractor shall make the necessary corrections in a timely manner and request re-inspection.

Payment to the Contractor for seeding areas will be approved once the seed has been established and meets the requirements of this paragraph of this specification.

GUARANTEE

The Contractor shall guarantee a stand of turf is considered acceptable when a live vigorous stand of permanent grass is established with growing sprouts visible at the surface showing not less than 9 seedlings of permanent grass at least 2 inches long in each square foot, and where no gaps larger than 4 inches in diameter occur anywhere in the lawn area. Permanent grass is defined as Common Bermuda, Centipede, and Fescue.

02934 SEEDING WETLANDS

GENERAL

All exposed ground surfaces that have been disturbed during construction shall be graded to original contours, reasonably smooth, and free of trash and debris. Grassing shall be accomplished as soon as practicable after sections of work are completed. Seeding shall be performed by an experienced subcontractor specializing in this type of operation, unless otherwise approved by the Engineer in writing. Disturbed sections shall not exceed one half mile, without prior approval by the Engineer. Grassing shall be in accordance with the following specifications:

PREPARATION OF THE SOIL

The topsoil shall be loosened and mixed to the depth of 4" to 8". Suitable equipment meeting the approval of the Engineer shall be used. The soil shall be free of clay lumps, brush, weeds, stones, roots, stumps or any other substance that might inhibit plant growth. Assistance of the local agricultural agent is recommended.

Provide agricultural lime at rate required to bring soil acidity to slightly acid - ph 6, according to soil test report.

Lime and fertilizer shall be applied uniformly and mixed with the soil during seedbed preparation.
Apply 10-20-10 commercial fertilizers at the rate of 20-lbs./1000 s.f. for warm season mix and 10-20-10 commercial fertilizer at a rate of 20 lbs./1000 s.f. for cool season mix.

Apply 10-10-10 commercial fertilizers at the rate of 20-lbs./1000 s.f. for temporary cover crops. In addition, provide 15-lbs./1000 s.f. of superphosphate.

The following is for the warm season mix:

a. All warm grass seed shall be debearded or conditioned by brushing to create a product nearly the same as debearding. This does not apply to Switchgrass.

b. Disk two times to break-up crop residue and dirt clods prior to seeding.

c. Pack soil to create a firm seedbed with a cultipacker or roller.

d. If a rain shower should fall after the seedbed is prepared but before planting break-up any crust formation.

e. Seeding shall be installed to a depth of 1/4" utilizing a rangeland drill or conventional grass drills. It is extremely important that seed not be planted deeper than 1/2" depth. Do not disc or harrow after seeding. This will put the seed too deep. A Brillion seeder will be acceptable.

The following seed mixture shall be used:

Dates	Types	Rate
April 1 - July 15	***Warm Season Mix*** Switchgrass, Cave-in-rock, Alamo Smartweed; and Japanese Millet or Sorghum Sudan Grass Hybrids (Mow prior to maturity)	 8 pls #/acre or 4 oz./1000 s.f. 2 bulk #/acre or 1 oz./1000 s.f. 20-lb/acre or ½ lbs/1000 s.f.
July 16 - Sept 1	Temporary crop of Japanese Millet or Sorghum Sudan Grass Hybrids (To be followed by permanent mixture)	20-lb/acre or ½ lbs/1000 s.f.
Sept 2 - Nov 1	***Cool Season Mix*** Reed Canary Grass	12 bulk #/acre or 6 oz./1000 s.f.
	Smartweed	2 bulk #/acre or 1 oz./1000 s.f.
Nov 2 - March 31	Temporary Crop of Wheat (To be followed by permanent mixture	40 lbs/acre

All highway rights-of-way, and private yards disturbed shall also be re-seeded or sodded with the same type of grass previously found. The seed mixture specification shall be used as a guide and the Contractor is charged with the responsibility of seeding areas with the proper type of grass existing.

Seed shall be broadcast uniformly by hand or by approved sowing equipment. One half of the seed shall be sown in one direction and the remaining shall be sown at right angles to the first. Do not seed when the wind velocity exceeds 5 miles per hour. Rake lightly into top 1/8 inch of the soil prior to compacting, with a roller not exceeding 100 pounds.

All seeded areas will be mulched with 75 pounds to 100-lbs./1000 s.f. of clean wheat straw, spread uniformly, approximately 1/4 of ground should be visible to avoid smothering seedlings. If hydro-seeded, use virgin paper mulch only. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind; water or other causes and promptly remove any blockage, which may occur.

MAINTENANCE AND GUARANTEE

The Contractor shall protect and maintain grassed areas as necessary to establish a uniform turf composed of the grasses specified. The Contractor shall re-seed any bare areas and repair all eroded areas.

Maintain seeded areas by watering, fertilizing, mowing, weeding, and other operations such as rolling, regrading, replanting, aerating, mulching as required to establish an acceptable lawn free of eroded or bare areas.

ACCEPTANCE

The Contractor shall guarantee a stand of turf is considered acceptable when a live vigorous stand of permanent grass is established with growing sprouts visible at the surface showing not less than 9 seedlings of permanent grass at least 2 inches long in each square foot, and where no gaps larger than 4 inches in diameter occur anywhere in the seeded area.

DIVISION 3
CONCRETE

03301 CONCRETE CONSTRUCTION (UTILITY)

GENERAL

Concrete construction specified in this section shall be applicable to all "site work" and is not intended to cover general building specifications. The concrete work shall include all furnishing, hauling, fine grading and subgrade, form work, etc. and all incidentals necessary for completion of the work as it pertains.

MATERIALS

Concrete

The Contractor shall furnish and place concrete in strict accordance with the requirements of ACI 318 (most recent edition). Ready-mixed concrete from an approved mixing plan shall be used throughout the work and conform to the requirements of ASTM C-94 for batch, mixing, and transporting. Concrete shall be in accordance with the following requirements:

A. Under Ground - Regular Weight Concrete

28-day compressive strength	3000 psi
Coarse aggregate	1 ½” max. size stone
Slump	2" minimum, 4" maximum
Air Entrainment	No requirement

B. Walls, Slabs, Sidewalks, Curb and Gutter - Regular Weight Concrete

28-day compressive strength	3000 psi
Coarse aggregate	3/4" max. size stone
Slump	2" minimum, 4" maximum
Air Entrainment	5 more or less 1

The Contractor shall submit for approval mix designs, designed and tested by an approved testing laboratory, following the requirements of ACI 318 for each class of concrete to be used on this project. Mix designs in excess of one year old shall be verified. The Contractor will be responsible for all costs involved in the mix design. Material suppliers and material proportions incorporated in the mix design and certification shall not change without written permission from the Public Works Commission.

Admixtures used to produce entrained or air shall be sulforated hydrocarbons or neutralized vinsol resins conforming to ASTM C-260. Calcium chloride, other accelerators, or "anti-freeze" shall not be used without written approval by the Public Works Commission.

Reinforcing Steel

Reinforcing bars shall be new billet stock and shall conform to ASTM A-615, Grade 60. Bars shall be deformed to conform to ASTM A-305. The Contractor shall check and submit for approval four (4) sets of shop and erection drawings prepared by the fabricator. Reinforcement detailing and placement shall conform to ACI 318. All reinforcing bars shall be tied in place according to approved erection drawings, using bar supports and accessories conforming to ACI 315. Laps or splices shall conform to ACI 318, and consist of the following minimum dimensions:

Tension Splices	36 Bar Diameters
Compression Splices	30 Bar Diameters

All reinforcing bars shall be tagged and stored in such manner as to be readily available at the time needed. Tag mark substitutions will not be made.

Welded wire mesh fabric reinforcing shall conform to the requirements of ASTM A-185. Lap splices shall be at least one full mesh plus 2" staggered to avoid continuous laps in either direction and securely wired or clipped.

GRADING

The Contractor shall use every effort to observe any possible misalignments in line or grade of the installed forms and will call such to the attention of the Public Works Commission promptly. The Contractor is cautioned that he shall be responsible for any damage to utility lines caused by his negligence. The Public Works Commission or his representative shall then inspect the forms and if approved, pouring operations may begin. Where unstable material exists, the Contractor shall remove such material to a depth required to provide a stable subgrade at no additional cost to the Public Works Commission.

FORM WORK

Metal forms shall be used throughout the work except for short, odd length sections and in accordance with ACI 301 and ACI 347 (most recent editions). Earth cuts may be used as forms for unexposed vertical surfaces on footings, provided the soil and workmanship allow an accurate and curable excavation. Forms shall be kept in good condition at all times. Any forms which have become out of shape or otherwise unsuitable shall be removed from the work. Forms shall be of such section and design that they will adequately support the concrete and any construction equipment used in the work. Form sections shall be provided with interlocking joints to insure that the forms are tightly jointed together free from movement. Forms shall be held in place by metal pins, not less than eighteen (18) inches in length, with fastenings of metal and wedges to insure a correct, rigid setting.

Forms shall be of the dimension required for the designed cross-section shown on the plans. Built up sections to attain the required depth will not be permitted.

Forms shall be set true to the lines and grades established by the Design Engineer or as indicated

on the plans.

Forms shall be held rigidly in position and shall be of sufficient strength to resist springing out of line when concrete is placed.

PLACING CONCRETE

Prior to placing concrete, the subgrade shall be moistened and the contact side of the forms shall be cleaned and coated with a heavy oil. The Contractor shall not place any concrete without the forms, reinforcing steel and subgrade being inspected and approved by the Design Engineer. Placing of concrete is to be in accordance with ACI 304 (most recent edition). Water shall be removed from the excavation before placing concrete and water shall be diverted to prevent washing over freshly deposited concrete.

Concrete shall be placed as not to disturb concrete already in place and in such a manner as to require the minimum amount of lateral movement. Concrete shall be deposited in the forms without segregation. A tremie shall be used when the fall exceeds five (5) feet. Care shall be taken not to upset any forms during the concrete pouring operations. Any concrete showing misalignment due to form movement shall be removed and replaced at no additional cost to the Public Works Commission.

All concrete shall be consolidated in accordance with ACI 309 (most recent edition). Mechanical vibrators shall be operated by experienced workmen. Spading and rodding may be required to supplement mechanical vibration. Consolidation shall be adequate to remove any voids and after removal of the forms, no honeycomb shall be present. Should any honeycomb be present, the Design Engineer shall determine if the honeycomb is of a minor nature, the voids may be filled with mortar as approved by the Design Engineer.

All concrete within forms shall be brought to true section by the use of an approved straight edge and shall be tamped with straight edge to bring mortar to the surface, after which it shall be floated smooth by means of wood floats. No steel floats will be permitted. After true surface of section has been obtained, and after initial set has taken place, the entire surface shall be brushed with a dampened brush. All joints and all exposed edges shall be rounded off with approved jointing and edging tools. The type of finish required will be specified in the specific item of work specified or indicated on the drawings. All exposed surfaces of retaining walls, structures, etc. shall be given a Class 2 finish with ¼ inch chamfered edges.

No more concrete shall be laid than can be properly finished and covered during the daylight, unless adequate artificial light satisfactory to the Design Engineer is provided.

Immediately after finishing operations have been completed, the entire surface of the concrete shall be sprayed with an approved curing compound. The use of liquid retarding agents shall conform to standards specified by current AASHTO or ASTM Specifications.

Cold weather concreting shall be in accordance with ACI 306 (most recent edition) and hot weather concreting shall be in accordance with ACI 305 (most recent edition). Concreting shall be done when weather conditions are favorable unless otherwise directed by the Design

Engineer. Concrete operations shall be discontinued when the temperature of 40 degrees Fahrenheit is reached on a falling thermometer. No concreting shall be attempted when local weather bureaus indicate temperatures below freezing within the ensuing 24 hours unless proper precautions are made to protect concrete by covering with straw or other thermal insulation satisfactory to the Design Engineer. The Contractor shall be responsible for the quality and strength of the concrete laid during cold weather or hot weather and any concrete damaged by frost action or freezing shall be removed and replaced as directed by the Design Engineer and/or the Public Works Commission at the Contractor's expense.

Forms shall not be removed from the concrete for a minimum of 7 days, unless approved by the Design Engineer. The Contractor shall apply a curing compound or provide measures to maintain moisture for proper curing at his expense, if early form removal is approved. Immediately after the forms have been removed, all honeycomb areas shall be repaired (with one part cement and two parts sand) and earth backfill material shall be placed adjacent to the finished concrete and smoothed off to prevent an accumulation of standing water, subgrade saturation or under wash in the event of rain.

Both pedestrian and vehicle traffic shall be excluded from crossing the concrete for a period of 14 days by the erection and maintenance of suitable barricades. Contractor shall be responsible for any damage resulting from traffic within the 14 day period and he shall remove and replace any concrete damaged as directed by the Design Engineer and/or Public Works Commission.

MASONRY MATERIALS

Brick shall be in accordance with ASTM C-32 Grade MS laid in full beds of mortar with shove joints.

Concrete masonry blocks shall be in accordance with ASTM C-139. Blocks shall be at least 5", but not more than 8" in thickness nor less than 8" in length and of such shape that the joints can be effectively sealed and bonded with cement mortar.

Cement mortar for brick work shall be in accordance with ASTM C-270, Type M. Use Type IIA cement in accordance with ASTM C-150.

TESTING

The requirements of ACI318 (most recent edition) shall be used to control the evaluation of all concrete strengths. The strength is to be checked during construction by four (4) cylinders at the option and cost of the Public Works Commission, of which 1 shall be broken at 7 days, 2 at 28 days. If the specified strength is not achieved in 28 days, 1 reserved shall be stored and broken as specified by the Design Engineer. Cylinders shall be made and stored in accordance with ASTM C-13. Cylinders shall be for each day concrete is poured in excess of 10 cubic yards of each different type of concrete, as determined by the Design Engineer. All additional expenses required because of the failure of the materials to meet routine testing requirements, or poorly scheduled concrete deliveries, shall be borne by the Contractor.

09801 ANTI-MICROBIAL ADMIXTURE

GENERAL

All reinforced concrete precast manholes shall include a liquid anti-microbial admixture to render the concrete uninhabitable for bacterial growth. The admixture shall be included in the fabrication of the manhole by an approved concrete precast manhole manufacturer. Coatings applied to the interior walls of the manhole shall not be acceptable.

Further, all field mixed mortar, utilized in concrete precast manholes, shall include the anti-microbial admixture. The intent and purpose of this specification is to render all concrete and/or mortar within sanitary sewer service uninhabitable for bacterial growth. Any defects shall be cause for the replacement and correction of such defect as directed by the Public Works Commission, at no expense to the Public Works Commission.

RELATED SECTIONS

A. 02730 – Sanitary Sewer Systems
B. 02732 – Sewage Force Mains

REFERENCES

A. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
B. ASTM C1443 – Standard Specification for Precast Reinforced Concrete Pipe
C. ASTM C1577 – Standard Specification for Precast Reinforced Concrete Pipe

SUBMITTALS

All submittals shall be provided in accordance with the Contract Documents, and the requirements outlined herein. The Contractor shall submit, in accordance with the Contract Documents, product data, certifications, and product data, to include the following:

1. U.S. Environmental Protection Agency (EPA) registration number.
2. Documentation that the product has a minimum of 10 years of successful prevention of microbial induced corrosion in sanitary sewers.
3. Documentation that the precast facility is certified by the anti-microbial manufacturer.
4. Documentation from the precast facility stating that the correct amount and correct mixing procedure was followed for all anti-microbial concrete.

QUALITY ASSURANCE

A color identifier shall be applied to the interior of each concrete piece fabricated with the anti-microbial admixture. Each piece shall also be plainly stenciled with the name of the anti-microbial admixture on the exterior of each piece.

MATERIALS

All manholes shall conform to PWC standard specifications and details, unless otherwise approved in writing by the Public Works Commission. All concrete and mortar utilized in the construction of the manholes shall contain an anti-microbial admixture.

Anti-Microbial Admixture:

The liquid anti-microbial admixture shall be used in accordance with the manufacturer's recommendations. The amount of the admixture shall be included in the total water content of the concrete or mortar mix design. The admixture shall be added to the concrete or mortar mix water, to ensure even distribution of the admixture throughout the concrete or mortar mix. When properly prepared, the anti-microbial admixture shall render the concrete or mortar uninhabitable for bacterial growth.

The anti-microbial admixture shall be ConShield or approved equal. The ConShield liquid anti-microbial admixture can be obtained from ConShield Technologies, Inc. or an approved precast facility.

Field Repairs:

Field repairs to the precast concrete or mortar shall be in accordance with the admixture manufacturer's recommendations. All field repairs shall be completed in accordance with PWC requirements.

ACCEPTANCE

Acceptance of the concrete and mortar with the anti-microbial admixture shall be based on conformance with the requirements herein, the Public Works Commission's review of the installed manhole, and results of all testing.

09802 SPECIAL COATINGS - CERAMIC EPOXY

GENERAL

The interior surfaces of all ductile iron pipe and fittings shall be full coated with a ceramic epoxy lining. The ceramic epoxy lining shall be applied to ductile iron pipe free of any other interior lining material. The finish coat shall be applied to yield a minimum dry film thickness of 40 mils for a complete lining.

MATERIALS

The lining material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quarts pigment.

The epoxy material shall meet the following minimum performance requirements:

Permeability Rating: 0.00 perms when tested according to ASTM E-96 Procedure A with a test duration of 30 days.

ASTM 6-95 Cathodic Disbandment: 1.5 volts at 77° F.

ASTM B-117 Salt Spray: 0.00 undercutting after one year.

Immersion Testing ASTM D-714	Duration
20% Sulfuric Acid	1 Year
25% Sodium Hydroxide at 140° F	1 Year
160° F Distilled Water	1 Year
120° F Tap Water	1 Year

The above requirements shall be verified and tested by an approved testing laboratory. Copies of the laboratory test showing that the lining conforms to the specifications shall be furnished to the Public Works Commission, certified by the Supplier.

APPLICATION OF LININGS

Surface Preparation: All interior barrel and joint surface areas which will be exposed to the sewer liquids and gases shall be prepared for lining by removing all laitance form oil and other loose, foreign or deleterious materials which would adversely affect the bond of the lining compound of the pipe surface. All areas to receive the protective coating shall be abrasive blasted using compressed air nozzles with sand or grit media. The entire surface to be lined shall be struck with blast media so that all rust, loose oxides, etc., are removed from the surface. Any area where rust appears before lining must be re-blasted.

Qualification of Applicator and Workmen:

The lining shall be applied by a competent firm with a five year history of lining sewer pipe. The workmen employed by the applicator shall be experienced and competent in the application and inspection of the lining compound to be applied. The Public Works Commission shall have the right to require the applicator to furnish bonds covering proper performance and guaranteeing the payment of all obligations arising as a result of improper materials and workmanship.

Equipment: All application equipment shall be as recommended by the suppliers of the lining compound.

Application Technique: After the surface has been thoroughly prepared for application, the interior of the pipe shall be coated with the ceramic epoxy to a minimum dry film thickness of 40 mils. No lining shall take place when the substrate or ambient temperature is below 40° F. The surface must be dry and dust free. The number of coats of lining material applied shall be as recommended by the lining manufacturer, but in no case shall it be applied above the dry film thickness per coat recommended by the lining manufacturer. The time between coats shall be that specified by the lining manufacturer.

Repair: All damaged areas or test areas shall be repaired in accordance with the manufacturer's recommendation, so that the repaired areas are equal to the undamaged lined areas in all respects.

Inspection: All pipe linings shall be checked for thickness using a magnetic film thickness gauge, the thickness testing shall be done in accordance with the method outlined in SSPC-PA-2 film thickness rating. The interior linings shall also be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired as noted above.

Markings: Each joint, manhole unit, or pipe bend special shall be marked with the date of application of the coating system, the date of inspection, and the numerical sequence of application on that date.

Shipping and Handling: Equipment used to handle and transport the lined pipe shall be suitably designed and operated not to damage the lining. Any damage which does occur shall be repaired prior to the installation of the pipe in accordance with the manufacturer's recommendations, so the repaired area is equal to the undamaged lining in all respects.

SECTION E – TECHNICAL SPECIFICATIONS (WELL RELOCATION-PART C)

DIVISION I
GENERAL REQUIREMENTS

01000-1 – SPECIAL PROVISIONS (Well Abandonment/Relocation)

PART 1.

1.01 PURPOSE

These Special Provisions are intended to supplement and amplify the requirements of these Contract Documents. Where any article or item of these Contract Documents are modified or deleted by this section, the remaining unaltered provisions of that article, paragraph, subparagraph, or clause shall remain in effect. In the event of a conflict, these Special Provisions shall take precedence.

1.02 CUSTOMER SERVICE

The Contractor is expected to make every effort to reduce the impact of their operation to Fayetteville Public Works Commission's (PWC) operation and maintenance of the water and sewer system, and the affected customers within the project area. Full cooperation and coordination with PWC personnel, other utilities, and customers is expected. It shall be expected that the Contractor will promptly respond to any concerns voiced by customers and/or PWC personnel and make every effort to resolve them immediately. Providing exemplary customer service shall be incidental to this Contract, and no additional payment will be made for this service. The Contractor shall coordinate with the property owner to ensure access to the property is not inhibited at any time. To reduce any inconvenience to the property owner, the Contractor shall ensure existing wells are not abandoned until proposed wells are installed and active.

1.03 REPLACEMENT OF FENCING

The Contractor is to replace any fencing disturbed as part of their operations for the work described within these Contract Documents. If fence removal is required during construction, PWC shall reimburse the Contractor for costs associated with removal and replacement of existing fencing. If temporary fencing is required, the Contractor shall provide such fencing as necessary, at no additional cost to the Owner. Temporary fencing shall be of chain link construction and shall be a minimum of six (6) feet in height. The Contractor is responsible to coordinate the fence removal and replacement for both the temporary and permanent placement with the property owner. Fences removed during construction activities shall be replaced using new materials which match existing and shall be constructed to the same height as existing to restore the fence to the original condition or better.

1.04 PUBLIC CONVENIENCE

A. CONTRACTOR'S DUTY AND OBLIGATION TO THE PUBLIC
The Contractor at all times shall conduct the work in such a manner as to ensure the least obstruction to traffic practicable. The convenience of the general public and of the residents and businesses along and adjacent to the street(s) shall be provided for in a satisfactory manner, consistent with the operation and local conditions. Costs for such work shall be incidental to the unit prices bid. The Contractor shall at all times cooperate with the public and merchants affected by the construction operations and shall maintain good public relations at all times.

The Contractor shall schedule and stage construction in a sequence to minimize disruption to the largest number of residents/businesses for the shortest period of time. Special considerations shall be given to the neighborhood solid waste and trash collection schedule, mail delivery, and bus routes, if applicable.

B. PUBLIC SAFETY

The Contractor shall barricade all work, roads, etc. to keep the public away from the construction. The Contractor shall provide protection to all portions of the Work when the work is not in progress. The Contractor shall provide and install all measures necessary to protect the public. Damage due to the lack of proper protection shall be the Contractor's sole responsibility.

The Contractor and subcontractors shall be responsible for any damage to any Owner's property, private property, or property owned by other utilities. The Contractor shall repair all damage to as good as or better than existing conditions. The Contractor and subcontractors shall be responsible for and pay any claims.

C. JOBSITE REQUIREMENTS

In addition to requirements outlined in these Contract Documents, the following are mandatory requirements that will be strictly enforced:

- Posted speed limits shall be strictly adhered to. No speeding.
- Driveways shall not be blocked without prior notification and coordination with the resident.
- To the maximum extent possible, one lane of traffic shall be maintained at all times.
- Excess soil, stone, equipment, materials, etc. in the road or along the right-of-way shall be removed at the end of each workday. Soil, stone, millings, pipe, etc., shall not be stored or stockpiled in the road right-of-way.
- Mailboxes and traffic signs shall be only removed as necessary to facilitate the installation of the Work and shall be reinstalled during the same day of removal. Any damages to mailboxes, signs or posts shall be repaired by the Contractor at no cost to the Owner.
- Contractor(s) shall not enter onto private property for the purpose of using water or electricity without the written permission of the property owner.
- The use of profane or abusive language or obscene gesturing by workmen will not be tolerated and will be just cause for immediate dismissal from the project site as directed by the Owner or its authorized representative.
- OSHA safety measures are to be maintained at all times.
- An English-speaking Contractor's representative is required for each separate work crew.
- Do not litter at any time.
- Respond to all complaints within 24 hours.
- Wear proper protective clothing (hard hats, shoes, shirts, etc). Personnel must wear an approved safety vest at all times while working on the Owner's project.
- The trench shall be completely backfilled at the end of each workday.
- If construction is temporarily halted during the workday, the open trench shall be manned continuously.
- Damage to sod and/or grass along the street right-of-way due to (but not limited to) temporarily stockpiled material, construction travel and other construction related activities shall be replaced with sod at the Contractor's sole expense.

PART 2.

2.02 UTILITIES

A. OWNERSHIP OF EXISTING UTILITIES

Existing utilities indicated on the Plans to be abandoned shall remain the property of the property owner. The Contractor shall be responsible for removing the existing utilities as noted on the plans and removing the material from the site unless otherwise directed by the property owner. The property owner shall have the right of first refusal regarding the salvage of the material.

B. CONSTRUCTION AROUND UTILITY POLES AND GUY WIRES

The Contractor will be required to perform construction work around utility poles and guy wires which shall be left in place within the construction limits of the project. The Contractor shall contact the owner of the utility to coordinate securing the poles during construction. It may be necessary for the Contractor to hire an electrical utility contractor to secure poles. All work outlined in this paragraph shall be at no additional cost to the Owner.

C. UTILITY COORDINATION

Whenever the property owner's use of the water must be interrupted by the Work, the Contractor shall notify the residents a minimum of 48 hours prior to service interruption. This notification shall be accomplished with door hanger notification cards placed at the addresses of the affected residents. Property owners shall be informed when service interruption takes place and the expected duration. To minimize the duration of interrupted water services, the Contractor shall not abandon/disconnect existing water service until the proposed well and water utilities are installed and ready to be activated.

D. PROTECTION OF EXISTING UTILITIES

The Contractor shall take every precaution to prevent damage to existing utilities. Any damage to existing utilities shall be replaced or repaired by the Contractor.

If existing utilities are damaged, the Contractor shall immediately notify the property owner and the Project Coordinator. The Contractor shall immediately commence repairs to the damaged utility in accordance with the property owner's requirements.

Any damage to the City of Fayetteville's storm drainage infrastructure shall be repaired in accordance with City of Fayetteville requirements within seven (7) business days after damage occurs. All costs associated with the required repairs shall be the responsibility of the Contractor, at no cost to the Owner.

E. SPILL RESPONSE

The Contractor shall not discharge or pump any sewage, solids, or debris on the ground, streets, storm water system, ditches, or streams. Any sewage spills shall be immediately reported to the North Carolina Department of Environment, Health, and Natural Resources, (919) 807-6308.

In the event that raw sewage is spilled, discharged, leaked or otherwise deposited in the open environment, due to the Contractor's work, the Contractor is responsible for any clean-up of solids and disinfection of the area affected. This work will be performed at the Contractor's expense with no additional cost to the Owner. The Contractor is also responsible for complying with all

regulatory requirements in regard to the size spill with no additional cost to the Owner. The Contractor shall cooperate fully with the Owner and the applicable state agencies in responding to and cleaning up the spill. Any work completed by the Owner in responding to a spill caused by the Contractor's operations shall be billed to the Contractor.

F. DAMAGE TO EXISTING UTILITIES

If the Work is delayed as a result of damage to an improperly marked utility, the Contractor may request an extension of the Contract Time in accordance with these Contract Documents. Should the Contractor determine compensation for the delay is also warranted, the Contractor shall submit a claim to the utility owner. Adjustments to the Contract Price will not be made due to delays or additional work resulting from damage to existing utilities that are not properly located.

If the Work is delayed as a result of damage to a properly marked utility, no additional Contract Time or compensation shall be granted.

G. CROSSING EXISTING OR PROPOSED UTILITIES

The Contractor shall conduct their operations so that the following requirements are adhered to:

1. Underground telephone, cable TV, and gas utilities or conduit banks shall be crossed maintaining a minimum of 12-inch separation or clearance.

2. Electrical crossings shall be performed while the conductor is de-energized and at all times in the presence of the utility owner. Electrical crossings shall be in accordance with NESC requirements. Electrical primary conductor crossings shall be as follows:

    a. Crossing over a conductor, maintain a minimum of 12-inches of undisturbed soil encasing the conductor.

    b. Crossing under a conductor shall be accomplished by boring, maintaining 12-inches of undisturbed soil encasing the conductor.

No separate payment shall be made for this work.

H. WATER SUPPLY WELL SYSTEM INSTALLATION

The Contractor shall enlist a licensed plumber and electrician licensed in the State of North Carolina to perform due diligence prior to completing the plumbing and electrical works improvements such that the following steps are completed for properties within the project boundary that require a well relocation. All verifications must be coordinated with PWC Project Coordinator minimum of two weeks in advanced to gain access and entry to residence crawlspace to inspect existing water supply appurtenances, including bladder tank, pressure switch, and piping, and interior of residence if inspection of main electrical panel is needed. Verification or condition assessment of existing conditions shall be coordinated closely with installation of new well and the expected new well pump size to verify required water supply and electrical power upgrade.

1. Verify current configuration of the water well system to confirm most effective water supply piping from relocated well to existing plumbing.

2. Verify ability to reuse existing pressure switch, bladder tank, etc. or if new appurtenances are needed to serve the property.

3. Verify electrical loading capacity of existing breaker and circuit from the residential control main electrical breaker panels to confirm it is acceptable to power new well pump. If a larger pump exceeding the acceptable load capacity of the existing circuit and breaker occurs, determine available load capacity of existing circuit and breaker to power new well pump. If the existing electrical system is acceptable and meets all current local and state electrical building codes, then complete wiring of new well pump utilizing existing buried circuit and acceptable buried, waterproof splice to new power wiring for new well pump.

For the basis of bid comparison and determination, Contractor is to price work based on the following:

1. Abandonment of existing wells as shown on the "Additional Services-Well Relocation on Lakeview Drive" Drawings

2. Install complete a new residential well as shown on the "Additional Services-Well Relocation on Lakeview Drive" Drawings

3. Connect new water supply pipe from new well to the crawlspace or home.

4. Connect new electrical circuit to the existing electrical panel and circuit breaker that meet all local and state building code requirements.

5. The Contractor shall coordinate, prepare, submit, and acquire all applicable building and inspection permits upon determination of the required plumbing and electrical improvements.

6. Should the verification determine that an existing electrical system is unacceptable and requires upgrades outside these boundaries or entails complete replacement of electrical circuit, circuit breaker replacement/upfit and/or other electrical upfits to meet required conditions and/or current code, the Contractor shall replace the electrical systems from limits as shown on Drawings to the residential structure as required. The method of measurement and basis of bid of electrical work should simply be replacement of power wiring from pump to breaker electrical panel. Any breaker upfit or additional upfits to the main panel will be verified based on a field adjusting directive and paid out of an allowance since these efforts will be dependent upon required well pump size and the possibility of substandard wiring, breakers, or other issues at the panel and that do not conform to code.

7. Should the verification determine that an existing plumbing system is unacceptable and requires upgrades outside these boundaries or entails complete replacement of water supply piping, pressure switch, bladder tank, piping, and any other incidentals to meet required conditions and/or current code, the Contractor shall replace the water supply system from limits as shown on drawings to the crawl space at residential structure as required.

The Contractor shall install water supply wells to comply with the following conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a)(1) and (2):

1. Grout will be required the entire length of the casing from land surface into gravel pack/confining layer.

2. The well shall be sampled for bacteria and inorganics.

3. No potential sources of groundwater contamination shall be stored near the well-head.

4. The well shall meet current 2C.0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The Contractor shall install water supply wells in accordance with all other requirements and criteria of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to comply with any other applicable Federal, State, or local laws or regulations.

I. BUILDER'S RISK POLICY

The Contractor shall furnish Builder's Risk as specified in General Conditions 00700 (Article 1.03.A.4) for all well abandonment and relocation work.

2.02 TESTING

A. COMPLIANCE SAMPLING/TESTING

Following installation of wells, the Contractor will complete required sampling and analysis of groundwater collected from wells within 30 days after issuing a certificate of completion in accordance with Section .3800 15A NCAC 18A .3802. Water samples shall be collected from the sample tap at the well or the closest accessible collection point to the water source with a tap capable of being disinfected, provided the sampling point shall precede any water treatment devices. Samples shall be collected using aseptic sampling techniques for collection of coliform bacteria and sampling techniques and containers for chemical constituents following methods described in 40 Code of Federal regulations 143.4 Monitoring, which are incorporated by reference including any subsequent amendments, additions or editions. Samples for total coliform and fecal coliform bacteria shall be collected after the disinfectant agent has been flushed from the well and water supply system. The water shall be determined to be free of disinfectant before collection of samples for bacteria. Water samples shall be analyzed in the North Carolina State Laboratory of Public Health or a certified laboratory. Water samples shall be tested for total coliform bacteria, and if present, further analyzed for the presence of fecal coliform bacterial or E. coli. Water samples shall also be analyzed for arsenic, barium, cadmium, chromium, copper, fluoride, lead, iron, magnesium, manganese, mercury, nitrate, nitrite, selenium, silver, sodium, zinc, and pH.

2.03 CONSTRUCTION REQUIREMENTS

A. COORDINATION OF WORK

The Contractor shall maintain unobstructed access to all areas for other Contractors. The Contractor is required to conduct his operations in a manner that will not interfere with or damage work that is being performed by others. The Contractor shall coordinate his operations in a manner which will facilitate the progress of work in adjacent areas.

Any conflicts or interference that cannot be resolved through direct communication with other Contractors working on the site shall immediately be brought to the Project Engineer's attention for resolution. The Project Engineer's decisions regarding resolution of conflicts between Contractors shall be final and binding. The Contractor shall not claim extra compensation for delays caused by other Contractors unless such delays are clear violations of a prior coordination agreement facilitated by the Owner.

B. CONSTRUCTION FACILITIES

The Contractor shall be responsible for obtaining all temporary utilities required for construction at no additional cost to the Owner. The Contractor shall make all necessary arrangements for securing water for construction purposes. The Contractor shall contact the utility owner to obtain the necessary permit for the temporary water usage.

C. CLEANLINESS DURING CONSTRUCTION

The Contractor shall perform a daily clean-up of all dirt, debris, scrap materials and other items resulting from their operations. No open accumulation of refuse, surplus or scrap materials will be permitted. The Contractor shall legally dispose off-site all waste materials and other excess materials resulting from construction.

Failure of the Contractor to maintain a clean site, including streets, will be basis for the Owner to issue a written notice of non-compliance with the Contract. The Contractor shall comply with the notice within 24 hours or as directed. If the Contractor fails to comply, the Owner may authorize the cleanup to be performed by others and the costs shall be deducted from the Contractor's pay application.

D. RIGHTS-OF-WAY

The Contractor shall locate the limits of the rights-of-way, or property lines prior to beginning construction and shall not encroach beyond those limits. The Contractor shall be solely responsible for any damage to property resulting from failing to locate these limits prior to beginning construction.

E. RESPONSIBILITY FOR MATERIAL

All pipe, fittings, manholes, and other materials shall be inspected upon arrival at the job site by a competent superintendent before unloading to ensure that the quality of the materials conform to the specifications. All materials shall be subject to inspection by the County. Materials found to be defective shall be clearly marked and removed from the project.

F. WATER OUTAGES

The Contractor shall schedule, coordinate and sequence so new well installation and water supply connection results in minimum outage (less than 2 hours as specified herein) to customer.

The Contractor shall schedule a coordination meeting with the Project Coordinator and Project Engineer a minimum of three (3) working days prior to any proposed water outage. The coordination meeting shall be conducted prior to any notices being issued. The Contractor shall locate (vertically and horizontally) any utilities within the work area, in accordance with these Contract Documents. The locations of all utilities within the work area shall be determined prior to the coordination meeting. Any conflicts with the proposed work and the existing utilities shall be identified, and a plan for resolving the conflicts shall be presented to the Owner. The purpose of this coordination meeting is to ensure that the Contractor has a good understanding of the requirements related to the proposed outage, verify that there are no utility conflicts, discuss any

necessary contingency plans, and all equipment, materials, tools, and all other incidentals necessary to complete the work are on the project site in good working order. The Contractor shall also provide a proposed construction sequence to present to the Owner and/or the Project Engineer for approval. **The proposed construction sequence shall be developed with the intent to mitigate the duration of water service interruption for the property owner.**

Should, for any reason, the Owner deem that the Contractor is not prepared for the proposed outage, the outage notifications will not be distributed, and the outage shall be postponed a minimum of two (2) weeks. The Owner will provide written notification to the Contractor of this decision. No additional contract time will be granted for this delay. Should the Contract time expire within that two (2) week period, the Owner reserves the right to assess liquidated damages, as outlined in these Contract Documents.

Once the water outage notifications have been issued, a follow-up coordination meeting with the Project Coordinator and Project Engineer shall be held a minimum of 24 hours prior to the scheduled outage. The purpose of this meeting is to verify that the Contractor is prepared to proceed with the outage, and that all equipment, materials, tools, and all other incidentals necessary to complete the Work are on the project site and in good working order. If for any reason the Owner deems that the Contractor is not prepared, the outage shall be postponed, and all customers immediately notified of the cancellation. The outage shall be postponed a minimum of two (2) weeks. No additional Contract time will be granted for this delay. Should the Contract time expire within that two (2) week period, the Owner reserves the right to assess liquidated damages, as outlined in these Contract Documents.

The Contractor shall complete the required work and restore water service within two (2) hours following service interruption. Should the Contractor fail to complete the work within the allotted time, the Owner shall assess a penalty of $500 per 15-minute interval or any portion thereof until water service is restored. This penalty will be deducted from the Contractor's pay application or be billed directly to the Contractor. The penalty may be waived for circumstances beyond the Contractor's control, as deemed by the Owner. The Project Coordinator and/or Project Engineer reserve the right to cancel or postpone the outage at any time, for any reason.

G. DISPOSITION OF SURPLUS PROPERTY

All property which is surplus to the needs of the project will remain or become the property of the Contractor, unless otherwise stated in these Contract Documents. All property belonging to the Contractor shall be removed from the project by the Contractor prior to final acceptance.

H. CONTRACTOR'S RESPONSIBILITY FOR WORK

Until final acceptance by the Owner, the project site and all the Work shall be the responsibility of the Contractor. The Contractor shall take every precaution to prevent damage to the project site, Work, and the surrounding areas. It shall be the responsibility of the Contractor to address any damage or injury arising from their direct or indirect performance on this project. The Contractor shall be responsible for maintaining the project site at all times and ensuring that the Work is installed and maintained in accordance with these Contract Documents until accepted by the Owner. This paragraph does not supersede the requirements of the general warranty.

I. FINAL COMPLETION DOCUMENTATION

Prior to receiving final payment, the Contractor shall complete and/or provide the following:

1) Complete all punch list items to the satisfaction of the Project Engineer.
2) Satisfactorily resolve all customer complaints and obtain the required releases.
3) Provide project record drawings, in accordance with Submittals Section 01300;
4) Provide well abandonment reports, well completion reports, and well water analytical records to the Cumberland County Health Department in accordance with NCAC Title 15A Subchapter 2C Section .0100; and
5) Provide project close-out submittals in accordance with Submittals Section 01300.

DIVISION I
GENERAL REQUIREMENTS

01025-1 MEASUREMENT AND PAYMENT (Well Abandonment/Relocation)

GENERAL

A. The purpose of this Section is to define the methods of measurement and payment for each of the unit prices and/or lump sum prices listed in the Bid Form, which are required to construct the Work. Payment will be made based on completion in a satisfactory manner of the specified items included in the description in this Section for each Bid Item. Not all Work required, significant, or incidental, is identified in this Section or in the Bid Form. Where Work is shown on the Drawings and//or specified in the Contract Documents, but not specifically described in this Section or is incidental to or affiliated with the Work as described, the Work shall be deemed to be included in the value of the Work described in the Pay Items with which the Work is most closely associated. All Work so shown or specified is included in these payment items.

B. The unit price and/or lump sum price bid shall be full compensation for the work required under each bid item, which shall include all incidental costs relative thereto. Certain items of work are specified and/or shown as a detail in the Contract Documents and drawings; bid prices shall include all items of work required to furnish and/or install each in accordance with the Project requirements, whether specifically stated or itemized in the Measure and Payment description.

C. Certain bid items have been designated to conform to maximum payment widths and/or lengths and no additional payment therefore will be allowed unless otherwise approved by the Fayetteville Public Works Commission (PWC). These designated items will be as identified in the Bid Form, Technical Specifications and as may be indicated on the Drawings. The designation of these items of work shall be noted as “No Overage Allowed” or “NOA”. Prospective bidders shall be responsible for verifying that the actual quantities of work are listed in the Bid Form prior to submitting bids and include all costs (regardless whether the Bid quantities are over or under the quantities indicated on the Drawings) in the unit price bid.

LUMP SUM PAYMENT ITEMS

C1 MOBILIZATION/ DEMOBILIZATION

A lump Sum Payment less than or equal to 5% of the Total Bid Price (to include all bonds, insurance, move on expenses, etc.) will be allowed for “mobilization” and “demobilization” as a progress payment line item. The actual cost of bonds and insurance (up to the maximum payment of 5%) will be considered in the initial payment request provided that cost documentation suitable to the PWC Project Engineer is furnished by the Contractor. Any outstanding balance of the mobilization and demobilization Pay Item will be payable when the Project is determined to be 10% complete as indicated by the approved progress payments (less cost of mobilization).

C2 TRAFFIC CONTROL & TRAFFIC PLAN

The lump sum prices bid under each PART in the Bid Form shall include all costs for the preparation and implementation of required traffic management plans, furnishing, installing and maintaining traffic control signage and devices, relocating or removing signs or other traffic control devices, replacement of street signs, replacement of traffic signal loops, and all other incidental work throughout the project site, throughout the project duration. The Contractor shall coordinate his activities so as to minimize disruption of traffic and inconvenience to residents and the general public. All such traffic control devices, signage, traffic patterns and road closures shall be approved by the City of Fayetteville and/or NCDOT. All traffic control measures outside of public right-of-way shall be approved by the PWC Project Engineer.

Payment under the lump sum prices shall be made as follows:

(1) 25% of the Lump Sum Price when the Project work is 10% complete as indicated by approved progress payments.

(2) 50% of the Lump Sum Price when the Project is 50% complete as indicated by approved progress payments.

(3) 100% of the Lump Sum Price when the Project is 80% complete as indicated by approved progress payments.

Prospective bidders are advised that failure to provide and maintain adequate traffic control devices and/or signage may result in the Project Engineer's refusal to make payment until corrective measures are in place. Improper signage and/or traffic control devices will not be allowed. The City of Fayetteville, NCDOT, and/or the Fayetteville Public Works Commission reserves the right relocate and/or remove such non-conforming signs and devices, setup proper signage to ensure public safety and deduct all costs for these items which may be incurred by the Owner. The Contractor shall make no claim for such work performed.

C3 EROSION AND SEDIMENTATION CONTROL

The lump sum prices bid under the applicable PARTs in the Bid Form bid for erosion and sedimentation control shall include all costs for furnishing, erecting, maintaining and removing silt fence, temporary sedimentation control devices, and any other erosion control devices shown or as may be required by the appropriate regulatory agencies throughout the project site, throughout the project duration. No additional payment will be made for removal of soil and debris from drainage structures, features, or reconditioning grading that is part of the normal maintenance activities associated with the approved erosion control plan. No additional payment shall be made for any other work due to inadequate or improperly maintained measures.

Prospective bidders are advised that erosion and sedimentation control will be strictly enforced, and any failure to conform to required standards is considered a right precedent to the Owner to deny

payment. Additional measures required by the North Carolina Department of Environmental Quality (NCDEQ) shall not be cause for change in the lump sum price bid. Bidders shall make themselves aware of all NCDEQ regulations and requirements. The Contractor shall be responsible for all fines levied due to improper erosion and sediment control measures to include all costs incurred by City of Fayetteville and/or Fayetteville Public Works Commission necessary to bring a non-conforming site into compliance.

The lump sum price bid shall include all costs necessary for the Contractor to comply with the requirements of the NPDES permit that is associated with the approved erosion control permit. Such activities include but are not limited to installation and maintenance of rain gauges, completing the required inspection reports, posting the permit and reports on the project, and furnishing copies of the inspections reports to the Owner.

Payment under the lump sum prices bid for each PART shall be made monthly as indicated in the Contractor's schedule for the substantial completion of all work under this Contract. In no case, shall the monthly payment exceed ten (10) percent of the lump sum prices bid without the approval of the Owner.

UNIT PRICE ITEMS

C4 CLEARING AND GRUBBING

The unit price bid per acre shall include the costs for felling trees, stump removal and disposal off-site, cutting trees in pulpwood length and stacking within limits of disturbance (LOD) if required, disposing of all trimmings, removing and disposing off-site all logs, branches, trunks, root mats, brush, vegetation, debris from clearing and grubbing operations and all other incidental materials not to be re-used in the work. Areas containing and requiring cutting and removal of weeds, grass, grain annual or perennial plants, or saplings less than one inch in diameter shall not be measured and paid for as clearing and grubbing. Payment shall be based on the horizontal area cleared and grubbed as designated on the plans or as directed by the Owner. Measurement will be made to the nearest one hundredth of an acre.

The unit price bid per acre.

C5 FENCE REMOVAL & REPLACEMENT

The unit price bid per linear foot shall include the cost associated with removal and replacement of existing residential property fence as needed to gain necessary access to the existing and proposed well locations. If fence removal is required during construction, PWC shall reimburse the Contractor for costs associated with removal and replacement of existing fencing. If temporary fencing is required, the Contractor shall provide such fencing as necessary, at no additional cost to the Owner. Fences shall be removed and replaced, using new materials as required, to restore the fence to the original condition or better.

C6 WELL ABANDONMENT

Payment under this item shall include all costs to abandon existing wells in accordance with NCDEQ requirements. Work shall include, but not limited to, chlorinating the well before

sealing, perforating the well casing, filling the well with cement, grout, bentonite, and or gravel, furnishing all necessary records to NCDEQ, furnishing all records and confirmations of receipt of records by NCDEQ to the Owner, removal and disposal of the existing well house/pumphouse, removal and disposal of piping, removing the pump and providing it to the property owner, disconnecting any electrical components from the power source to the well pump, disconnecting and plugging existing plumbing, and properly disposing of waste generated during well abandonment activities, and any other incidentals necessary to complete the work.

Abandoned wells are to be sealed at locations shown in the contract or as directed. Perform all work in accordance with NCDEQ requirements. Contractor shall utilize a Well Contractor that is certified by the State of North Carolina to perform abandonment. Prior to commencing clearing and grubbing in the easement, the Contractor shall inspect the area to determine if there are any wells within the clearing limits. The well shall be inspected from land surface to the entire depth of the well before it is sealed to ensure freedom from obstructions that may interfere with sealing operations. Before sealing, place chlorine in the well in sufficient quantities to produce a chlorine residual of at least 100 milligrams per liter in the well. All casing and screen materials may be salvaged except casing that is cemented in place. In the case of gravel-packed wells in which the casing and screens have not been removed, perforate the casing opposite the gravel pack at intervals not exceeding 10 feet. Completely fill bored wells with cement grout or dry clay compacted in place. Completely fill wells constructed in unconsolidated formations with cement grout by introducing it through a pipe extending to the bottom and raising it as the well is filled. Fill wells constructed in consolidated rock formations or that penetrate zones of consolidated rock to at least 5 feet below the top of the consolidated rock with sand, gravel, or grout opposite the zones of consolidated rock. Fill the remainder of the well with cement grout. Complete a certified well abandonment record (Form GW-30) and submit to the Owner and to NCDEQ.

C7 WELL INSTALLATION

Payment under this item shall include all costs to install proposed wells in accordance with NCDEQ requirements. Work shall include but not limited to all materials, labor and tools for drilling and installing the screened well including the well screen and casing, sand filter pack, bentonite, and grout or rock well including casing into competent rock and rock bore to yielding strata; well development which includes purging groundwater from newly installed wells to remove sediment until discharge is clear and free of sediment; furnishing all necessary records to NCDEQ; furnishing all records and confirmations of receipt of records by NCDEQ to the Owner; installation/connection of piping, fittings, valves, sample taps, hose bibs, manual pressure gauges, fasteners, gaskets, and pipe supports; furnishing and installation of well pumps; excavation (including exploratory excavation); connecting all electrical components from the power source to the well pump, pump controllers, motor drives, sensors, and accessories utilizing existing buried circuit and acceptable buried, waterproof splice to new power wiring for new well pump; installing/connecting plumbing; containerization and proper

disposal of all waste generated during well installation activities; and any other incidentals necessary to complete the work.

Piping within wells to include all ductile iron pipe and PVC pipe for raw and treated water.

Cost shall also include associated sampling and analysis of groundwater collected from wells within 30 days after issuing a certificate of completion in accordance with Section .3800 15A NCAC 18A .3802.

C8 Furnish and Install Well House/Pump House

Payment under this item shall include all costs to install well house/pumphouse; including heat trace wire or heat bulb for freeze protection if existing bulb is present; and any other incidentals necessary to complete the work. Well House/Pump House should match existing well house that is being replaced.

C9 Replacement of Existing Residential Water Well Electrical System

Payment under this item shall include all costs to replace the existing residential water well electrical system including electrical circuit wire/cable, circuit breaker replacement to meet required conditions and any other incidentals necessary to complete the work per State Requirements and Electrical Code.

C10 Well Electrical System Upfits (Allowance)

Payment under this item shall include all costs to upfit and/or replace the electrical panel. Any breaker upfit or additional upfits to the main panel will be verified based on a field adjusting directive and paid out of an allowance since these efforts will be dependent upon required well pump size and the possibility of substandard wiring, breakers, or other issues at the panel and that do not conform to code. All work shall be completed per State Requirements and Electrical Code.

Payment under this item shall be defined by General Condition Section 0700 Paragraph 9.02.

All invoices for electrical work shall be included for reimbursement to the Contractor. Any and all remaining allowance will be deducted from the Final Contract Price at time of final payment.

C11 Replacement of Existing Residential Water Well Plumbing System

Payment under this item shall include all costs to replace existing residential water well plumbing system including pressure switch, bladder tank, piping, and any other incidentals necessary to complete the work per State Requirements and Plumbing Code.

Payment for the plumbing should be assumed to be replaced from the existing residential well location to the crawlspace.

C12 SOD (NO OVERAGE ALLOWED)

Payment for placing sod as indicated on the drawings or as directed by the Project Coordinator or Project Engineer shall be made at the unit price bid per square yard listed in the Bid Form. Payment shall include grading, fine raking, sod bed preparation, pest and disease control, soil amendments, placing sod, anchoring, fertilizing, maintaining, protection of turf areas, removal and replacement of dying sod and watering to ensure growth. No payment will be made for sodding outside Limits of Disturbance (LOD) or rights-of-way disturbed. Contractor will be responsible for collateral damage outside LOD.

Stripping of topsoil will not be measured and paid for as a separate bid item. All work shall be included for payment under the applicable items listed in the Bid Form. Work shall include stripping, stockpiling, spreading, leveling, supplemental topsoil, filling, grading and compaction of suitable topsoil along right-of-way and LOD.

C13 GRAVEL & SOIL DRIVEWAY RESTORATION

Payment for restoring gravel & soil driveways as indicated on the drawings or as directed by the Project Coordinator or Project Engineer shall be made at the unit price bid per square yard listed in the Bid Form. Payment shall include grading, fine raking, and placing gravel/soil to pre-construction conditions. No payment will be made for repairs outside LOD, or rights-of-way disturbed. Contractor will be responsible for collateral damage outside LOD.

Appendix A
Geotechnical Engineering Investigation

FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Big Rockfish Creek Outfall
Hope Mills, North Carolina
F&R Project No. 66W-0027

Prepared For:

WK DICKSON
community infrastructure consultants

720 Corporate Center Drive
Raleigh, North Carolina 27607

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

August 12, 2019

FROEHLING & ROBERTSON, INC.

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August 12, 2019

Mr. Mark Fisher, P.E.
Program Manager
WK Dickson & Co., Inc.
720 Corporate Center Drive
Raleigh, North Carolina 27607

Subject: Report of Subsurface Exploration & Geotechnical Engineering Evaluation
FAYPWC – Big Rockfish Creek Outfall
Hope Mills, North Carolina
F&R Project No. 66W-0027

Dear Mr. Fisher:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the above-referenced project in Hope Mills, North Carolina. Our services were performed in general accordance with F&R's Proposal No. 1966-00042 Revision 2 dated July 20, 2018. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and subsurface conditions, and presents our geotechnical evaluations and recommendations for design and construction of the project.

We have enjoyed working with you on this project, and we are prepared to assist you with the recommended quality assurance observation and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

F. A. KAYSER
Mohammad Kayser, Ph.D., P.E.
Geotechnical Engineer

Michael S. Sabodish
Michael S. Sabodish, Ph.D., P.E.
Geotechnical Services Manager

TABLE OF CONTENTS

APPENDICES

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the areas of the proposed sewer alignments and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of seventy-five (75) Standard Penetration Test (SPT) borings (B-1 through B-22, B-25 to B-34, B-36A, B-36 to B-48, B-52 to B-75 and B-77 to B-81) to depths ranging from 10 to 50 feet below the existing ground surface;
- Preparation of typed boring logs and development of subsurface profiles;
- Performing corrosivity analysis and geotechnical laboratory testing on representative soil samples;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this report by professional engineers.

2.0 PROJECT INFORMATION

Based on preliminary plans (60% submittal dated 5/31/19) provided to F&R by McKim & Creed, the project will consist of the installation of about 48,072 linear feet (lf) of sewer located in Hope Mills, Cumberland County, North Carolina. The project site is generally located parallel to Stewarts Creek. The project is subdivided into seven sections as shown in the provided preliminary plans: *Big Rockfish Creek (BRC) Outfall (sheet C-4 to C-33) and six lateral sewer (LS) connections at Camden Woods (sheet C-34 to C-37, C-37A and C-37B), Lake Upchurch (sheet C-38), Steeple Chase (sheet C-39), Camden Glen (sheet C-39), Peartree Estates (sheet C-40 to C-44), and South Hampton (sheet C-45)*. The descriptions of these sections are described below. The general locations of these sections are referenced on the overall Site Location Map presented as Figures 1A to 1D in Appendix I.

- ***BRC Outfall*** begins on the west side of Blackbridge Road and Permastone Lake Road intersection, extends west parallel to the creek, through wetlands and continues towards Mariners Landing Drive (see Figure Nos 1A, 2A to 2V in Appendix I). After reaching Mariners Landing Drive, the sewer line runs along Mariners Landing Drive, then crosses Mariners Landing Drive and Camden Road at about 350 feet southwest from their intersections with Northbank Street and extends north towards King Road through wooded areas and behind private properties (see Figure Nos 2W to 2Z and 2AA to 2AK in appendix I). The sewer line will cross King Road and terminate (see Figure Nos 2AL to 2AM in appendix I). The sewer line will generally run through undeveloped, wooded, flood-plain areas, wetlands and under asphalt roads. Walnut Creek is located on the west side of the alignment, and a landfill abuts the east

side of the alignment. Borings B-1 through B-22, B-25 to B-34, B-36A, B-36 to B-48 and B-52 to B-63 were covered in this section of the outfall.

The outfall is proposed to be 34,092 feet long. The proposed sewer line from station 0+00 to station 229+11 and station 229+11 to station 340+92 will be designed with 24" and 18" diameter ductile iron pipe (DIP), respectively. It appears that open-cut excavation techniques will be used to install the majority of the sewer line within this segment. The depth of the open-cut line ranges from about 9 to 23 feet (between proposed manholes MH 1 to MH 129) below the existing ground surface. An aerial sewer line crossing has been proposed from manhole MH 22 to MH 24. Details related to the aerial crossing are not available at the time of this report preparation. A separate report will be issued once aerial crossing details become available.

Launching and receiving pits have been proposed between proposed manholes MH 75 and MH 76, MH 87 and MH 88, and station 339+14.23 and manhole MH 129 to cross Mariners Landing Drive, Camden Road and King Road, respectively. The proposed sewer line will enter Mariners Landing Drive from Lake Firm Road by, a 35 foot by 20 foot bore pit proposed to be located just east of Mariners Landing Drive (at proposed manhole MH 75), and a 20 foot by 20 foot receiving pit proposed to be on Mariners Landing Drive (located at proposed manhole MH 76). The bore and receiving pits depths will be approximately 26 and 27 feet, respectively. The sewer line will cross Camden Road near Northbank Street by, a 20 foot by 20 foot receiving pit proposed to be on the south side of the road (at proposed manhole MH 88) and a 20 foot by 40 foot launching pit proposed to be on the north side of Camden Road (at proposed manhole MH 87). The depths of the launching and receiving pits are approximately 15 and 25 feet, respectively. To cross King Road, a 20 foot by 40 foot launching pit is proposed on the south side of King Road (at about station 339+14.23), and a 20 foot by 20 foot receiving pit is proposed on the north side of King Road (at proposed manhole MH 129). The depths of the launching and receiving pits will be approximately 17 and 16 feet, respectively.

- ***Camden Woods LS Connections*** generally extend northward from the outfall (starts at proposed manhole MH 31) and past the end of Mission Hill Road (see Figure Nos. 1B, 2AN to 2AT in appendix I). About 1,000 feet north of Mission Hill Road, the LS connections splits at manhole MH 138 and terminates at the end of Newgate Street (MH 143) and Andalusian Drive (MH 149) (see Figure Nos 2AN to 2AT in Appendix I). The sewer line at this section generally extends through wooded, undeveloped properties that generally parallel an unnamed creek. The main LS connection is approximately 4,797 feet long with an approximately 1,419 feet long LS connection B. It appears that open cut techniques will be employed in these areas with excavation depths ranging from approximately 7 to 22 feet. The proposed sewer line will be designed with 12" diameter DIP. Borings B-64 to B-71 were covered in this section of the outfall.

- ***Lake Upchurch LS Connection*** generally extends westward from the outfall (starts at manhole MH 39) to Park Garden Court (manhole MH 51) (see Figure No. 1B in Appendix I). The sewer line generally extends through wooded, undeveloped properties. The LS connection is approximately 225 feet long. It appears that open cut techniques will be employed in this area with excavation depths ranging from approximately 13 to 23 feet. The proposed sewer line will be designed with 8" diameter DIP. No boring was performed along this section.

- ***Steeple Chase LS Connection*** generally extends southward from the outfall (starts at manhole MH 23) to Jockey Whip Lane (manhole MH 154) (see Figure No. 1C in Appendix I). The sewer line generally extends behind residential properties and parallel to Stewarts Creek. The LS connection is approximately 340 feet long. It appears that open cut techniques will be employed in this area with excavation depths ranging from approximately 2 to 9 feet. The proposed sewer line at this section will be designed with 12" diameter DIP. Boring B-11 was covered in this section.

- ***Peartree Estates LS connection*** generally extends eastward from the outfall off the west end of Ritson Lane (starts at manhole MH 102) and terminating near the end of Redspire Lane on the east side of an unnamed lake (manhole MH 177) (see Figure Nos. 1D, 2AU to 2AZ in Appendix I). The sewer line generally extends through wooded, undeveloped properties and wetlands. The LS connection is approximately 5,955 feet long. It appears that open cut techniques will be employed in this area with excavation depths ranging from approximately 5 to 22 feet. The proposed sewer line at this section will be designed with 12" diameter DIP. Borings B-72 to B-75 and B-77 to B-79 were covered in this section of the outfall.

- ***Camden Glen LS connection*** is a branch created from Peartree Estates LS connection at proposed manhole MH 162 and extends towards the Camden Glen pump station (see Figure No. 1D in Appendix I). The sewer line generally extends through wooded, undeveloped properties. The LS connection is approximately 24 feet long. It appears that open cut techniques will be employed in this area with excavation depths ranging from approximately 6 to 20 feet. The proposed sewer line at this section will be designed with 8" diameter DIP. No boring was performed along this section.

- ***South Hampton LS connection*** generally extends northward from the outfall (starts at manhole MH 17) to the West Hampton Phase 2 development just south side of Woodspring Drive and the west side of Perma Stone Lake) (see Figure Nos. 1C, 2AAA and 2AAB in Appendix I). The sewer line generally appears to extend through wooded and undeveloped property. The LS connection is approximately 1,222 feet long. It appears that open cut techniques will be employed in this area with excavation depths ranging from approximately 5 to 11 feet. The proposed sewer line at this section will be designed with 8" diameter DIP. Borings B-80 and B-81 were covered in this section of the outfall.

The bottoms of the proposed manholes are typically 6 to 12 inches below the proposed sewer line inverts.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced a total of seventy-five (75) Standard Penetration Test (SPT) borings (B-1 through B-22, B-25 to B-34, B-36A, B-36 to B-48, B-52 to B-75 and B-77 to B-81) to depths ranging from 10 to 50 feet below the existing ground surface at the approximate locations shown on the Boring Location Plans presented as Figures 2A to 2Z, 2AA to 2AZ, 2AAA and 2AAB in Appendix I. Borings B-23 and B-24 were cancelled due to their locations in wetland areas. Borings B-35, B-49 to B-51 and B-76 were cancelled due to property access issues. The boring locations were established in the field by F&R using a hand-held GPS unit. Ground surface elevations at the boring locations were interpolated from the provided 60% submittal plans. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The borings were advanced by track and an ATV-mounted drill rigs using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. At the boring locations, representative soil samples were obtained using a standard two-inch, outside-diameter (O.D.), split-barrel sampler in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils (Standard Penetration Test). The number of blows required to drive the split-barrel sampler three, consecutive 6-inch increments with an automatic hammer is recorded, and the blows of the last two 6-inch increments are added to obtain the Standard Penetration Test (SPT) N-values representing the penetration resistance of the soil. Standard Penetration Tests were performed at a nominal interval of approximately 5 feet.

A representative portion of soil was obtained from each SPT sample, sealed in a glass jar, labeled, and transported to our laboratory for classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM D2488). A boring log for each test boring is presented in Appendix II.

Groundwater level measurements were attempted at the termination of drilling in all of the borings with the exception of borings B-6 and B-7. Groundwater level measurements after a stabilization period of approximately 24-hours were also recorded in all of the borings with the exception of B-11, B-34 and B-64 since these borings were backfilled immediately after drilling completion. Temporary piezometers were installed in 24 borings (B-10, B-12, B-18, B-22, B-27, B-28, B-29, B-32, B-33, B-36, B-37, B-40, B-42, B-52, B-53, B-55, B-56, B-59, B-62, B-63, B-74, B-77, B-78 and B-79) in order to facilitate the obtainment of stabilized groundwater measurements. The temporary piezometers consisted of 1-inch diameter, hand slotted PVC pipe installed into the completed borings.

3.2 LABORATORY TESTING

F&R selected 13 representative soil samples and subjected them to geotechnical index testing consisting of natural moisture content, percent fines analysis, and Atterberg Limits determinations. The purpose of the index testing was to aid in our classification of the soil samples and development of engineering recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The soil laboratory test results are presented in Appendix III of this report.

In addition to the geotechnical testing, 42 soil samples were subjected to pH, chloride ion, soluble sulfates, electrical resistivity, redox potential, and sulfides testing to aid in assessing the corrosivity potential of the on-site soils as will be discussed in Section 4.4.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project sites are located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad flat plain with widely spaced low rolling hills where the near surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. It is noted that the Coastal Plain soils vary in thickness from only a few feet along the western border to over ten thousand feet in some areas along the coast.

According to the Geologic Map of North Carolina (1985), the sites are located within an area mapped as Cretaceous-period deposits and is comprised of sedimentary deposits that appear to be located within either the Cape Fear, Middendorf or Black Creek Formation. The Cape Fear Formation is described as yellowish-gray to blue-gray, mottled red to yellowish-orange sandstone and sandy mudstone with graded and laterally continuous bedding. Blocky clay, faint cross-bedding and feldspar and mica are common. The Middendorf Formation is described as containing sand, sandstone, and mudstone, gray to pale gray in color with an orange cast. Clay balls and iron cemented concretions are common in this geology. The Black Creek Formation is described as clayey deposits that vary in color from gray to black that contain thin beds of fine-grained micaceous sand and thick lenses of cross-bedded sand with fossiliferous clayey sand lenses in the upper part.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on an interpretation of the boring data using normally-accepted, geotechnical engineering judgments. Although the individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Subsurface profiles have been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profiles are presented as Figures 3 to 12 in Appendix I. Strata breaks designated on the boring logs and subsurface profiles represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within explored areas of the project site. More-detailed descriptions of the subsurface conditions at the individual boring locations are presented on the Boring Logs provided in Appendix II.

4.2.2 Surficial Materials

Surficial Organic Soils were encountered at the surface in 46 borings (Borings B-1, B-3 to B-5, B-8, B-9, B-11, B-13, B-14, B-16, B-17, B-18, B-20, B-21, B-26, B-30, B-32, B-33, B-34, B-42, B-44, B-47, B-48, B-52 to B-55, B-57 to B-68, B-70, B-71, B-72, B-74, B-77, B-78, B-79 and B-81) from the ground surface to depths of generally 1 to 8 inches with an average thickness of 0.2 to 0.3 feet. The Surficial Organic Soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term *Surficial Organic Soil* is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil depths provided in this report are based on driller observations and should be considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of the Surficial Organic Soil depths is subjective. Actual Surficial Organic Soil depths should be expected to vary.

Asphalt was encountered at the surface in borings B-27, B-28, B-29, B-36A and B-36 to B-41 to a depth of 0.1 to 0.2 feet.

Surficial materials (Surficial Organic Soils, asphalt, etc.) were not encountered in 19 borings (B-2, B-6, B-7, B-10, B-12, B-15, B-19, B-22, B-25, B-31, B-35, B-43, B-45, B-46, B-56, B-69, B-73, B-75 and B-80).

4.2.3 Fill or Possible Fill Soils

Fill or material that F&R believes may be fill (referred to as "possible fill" on the attached boring logs) were encountered in 12 borings (B-7, B-27, B-28, B-29, B-36 to B-41, B-77 and B-79). The fill soils were generally encountered to depths ranging from about 0.6 to 7 feet. The fill or possible fill soils consisted of silty and clayey sands (USCS – SM & SC) exhibiting very loose to dense relative density with SPT N-values ranging from 4 to 37 blows per foot (bpf).

A very loose (SPT N-value of 4 bpf or less) fill soil layer was encountered in boring B-41 from a depth of approximately 2 to 7 feet. SPT N-values less than 4 bpf are generally indicative of fill with poor compaction while N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted structural fill would generally be expected to exhibit N-values of 9 bpf or greater. In general, it appears that the fill varied from being poorly to well-compacted.

The fill soils typically encountered roots and/or fine to coarse gravel. Boring B-28 encountered wood from a depth of approximately 3 to 7 feet.

4.2.4 Native Soils

Native Coastal Plain soils were encountered in the borings from the ground surface or below the fill soils. The native soils generally consisted of silty and clayey sands (USCS - SM & SC), poorly graded sands (SP), low to high plasticity clays and silts (CL, CH, ML & MH).

Very loose/soft native soils (SPT N-value 4 bpf or less) were encountered in 41 borings (B-1, B-3, B-4, B-5, B-8, B-9, B-10, B-13, B-14, B-15, B-17 to B-22, B-26, B-29, B-30, B-32, B-36, B-42, B-43, B-45, B-46, B-48, B-53 to B-56, B-58, B-61, B-64 to B-68, B-71, B-74, B-75 and B-79) typically from the ground surface to depths ranging from approximately 2 to 7 feet. These loose/soft soils were also encountered deeper in the soil profile in 18 borings (B-3, B-10, B-15, B-21, B-25, B-31, B-34, B-41, B-45, B-46, B-54, B-56, B-57, B-65, B-66, B-69, B-78 and B-79) at depths ranging from approximately 7 to 30 feet. The average thickness of these soils was 5 to 10 feet. The majority of the remaining soils exhibited loose to very dense relative density for the sands or firm to very hard consistency for the clays and silts.

Layers of highly plastic clays and silts (CH & MH) were encountered in borings B-22, B-45, B-58, B-59, and B-72 in the upper 2 to 12 feet of the soil profile with average layer thickness of 5 feet. These soils were encountered deeper in the soil profile in 20 borings (B-4, B-5, B-13, B-14, B-15, B-17, B-18, B-20, B-22, B-37, B-40, B-45, B-59, B-60, B-61, B-65, B-68, B-71, B-75 and B-77) at depths ranging from 7 to 24.5 feet. The thickness of these soils varied from 3 to 10 feet with average thickness of about 6 feet. Highly plastic soils were encountered in boring B-10 from a depth of 22 to 42 feet.

A petroleum odor was noted in the sample collected in boring B-33 from a depth of 3.5 to 5 feet. Borings B-8, B-25, B-28, B-31 and B-37 encountered wood at depths ranging from 7 to 15 feet. Wood

fragments were noted in borings B-5, B-7, B-22, B-25, B-38, B-45 and B-81 at various depths typically from a depth of 3.5 to 20 feet. Roots were encountered deeper in the soil profile at depths ranging from 2 to 10 feet in borings B-10, B-25, B-41 and B-74.

4.2.5 Partially Weathered Rock

Partially Weathered Rock (PWR) was encountered in borings B-43, B-48, B-52, B-57, B-74 and B-75 at depths ranging from about 13.5 to 24.5 feet. These borings were terminated in PWR. An intermediate PWR layer was encountered in borings B-41, B-42 and B-46 at depths ranging from 14.5 to 19.5 feet. The thickness of the intermediate PWR layer was 0.5 feet. PWR is defined for engineering purposes as residual material that exhibits an SPT N-value of at least 100 bpf. The SPT N-values in the PWR ranged from 50 blows with 0" of split spoon penetration (50/0") to 50/6". The PWR was typically sampled as clayey silts, silty sands and sandy clays.

4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS

Moist (*i.e.*, within 3 percent of optimum moisture) soil samples were generally encountered near the surface of the borings to depths ranging from approximately 2 to 7 feet. Wet to saturated soils (more than 3 percent over the estimated optimum moisture content) were generally encountered below the moist soils to termination depths of the borings. Wet to saturated soils were encountered deeper in the soil profile in borings B-8, B-17, B-20, B-38, B-39 and B-66 at depths ranging from approximately 12 to 17 feet to termination depths of the borings. Wet or saturated soil samples were not encountered in boring B-9.

Groundwater level measurements were attempted at the termination of drilling in all of the borings with the exception of borings B-6 and B-7. Groundwater level measurements after a stabilization period of approximately 24-hours were also recorded in all of the borings with the exception of B-11, B-34 and B-64 since these borings were backfilled immediately after drilling completion. Groundwater was encountered immediately after drilling at 54 borings (B-1, B-3 to B-5, B-11, B-13 to B-19, B-22, B-25 to B-34, B-36, B-36A, B-37, B-40 to B-44, B-47, B-48, B-52, B-55, B-56, B-57, B-60 to B-63, B-65, B-69 to B-75 and B-77 to B-81) at depths ranging from 1.1 to 20 feet. At 58 borings (B-2, B-4 to B-7, B-10, B-12, B-14, B-15, B-18, B-19, B-22, B-25 to B-33, B-36, B-36A, B-37, B-40 to B-48, B-52, B-53, B-55 to B-63, B-65, B-68 to B-75 and B-77 to B-81) groundwater was encountered after a stabilization period of about 24 hours at depths ranging from less than 1 foot to 15 feet.

It should also be noted that soil moisture and groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. Due to the presence of relatively impervious silty/clayey soils and PWR noted on the project site, trapped or perched water conditions should be anticipated during periods of inclement weather and during seasonally wet periods.

4.4 SOIL CORROSIVITY EVALUATION

Corrosion potential of soils for underground structures is dependent upon several factors including pH, Chloride, Sulfate and Sulfide concentrations, Electrical Resistivity, and Redox Potential. Forty-two soil samples were subjected to laboratory testing to determine the potential corrosive characteristics of the soils at this site. The results are presented in the following table:

Boring	Sample Depth (ft)	pH	Chlorides (mg/kg)	Sulfates (mg/kg)	Sulfides (mg/kg)	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)	Corrosive Potential
B-1	13.5 - 15 18.5 - 20	5.2	< 29*	< 180*	< 52*	7,360	374	15.0	Low
B-2 B-13	13.5 – 15 13.5 - 15	4.0	< 30*	300	< 45.6*	5,300	401	15.6	Low
B-3	13.5 - 15 18.5 - 20	4.3	< 29*	310	< 46.3*	4,970	421	16.4	Low
B-4 B-5	18.5 – 20 18.5 - 20	5.0	< 30*	< 180*	< 46.6*	12,000	387	17.2	Low
B-7	8.5 - 10 13.5 - 15	5.1	< 30*	< 180*	< 49.7*	6,530	379	15.7	Low
B-9	8.5 - 10 13.5 - 15	4.1	< 28*	< 170*	< 43.8*	12,800	388	9.72	Low
B-10	8.5 - 10 13.5 - 15	4.0	< 29*	320	< 44.4*	5,850	444	14.9	Low
B-11	3.5 - 5 8.5 - 10	4.1	< 29*	220	< 44.5*	6,930	458	14.3	Low
B-14 B-17	8.5 - 10 18.5 - 20	4.0	< 35*	520	< 53.5*	4,630	471	29.2	Low
B-15	13.5 - 15 18.5 - 20	4.8	< 31*	< 180*	< 45.7*	17,100	431	18.3	Low
B-16	8.5 - 10 13.5 - 15	4.4	< 29*	170	< 44.9*	12,900	452	4.4	Low
B-18	8.5 - 10 13.5 - 15	4.4	< 30*	< 180*	< 44*	11,100	425	17.3	Low
B-21	8.5 - 10 13.5 - 15	4.2	< 44*	< 260*	< 75.7*	14,900	376	43.1	Low
B-22	13.5 - 15 18.5 - 20	5.0	29	< 180*	< 44.2*	20,400	386	15.0	Low
B-25	8.5 - 10 13.5 - 15 18.5 - 20	4.7	< 31*	< 190*	< 58.6*	10,100	387	19.9	Low

Boring	Sample Depth (ft)	pH	Chlorides (mg/kg)	Sulfates (mg/kg)	Sulfides (mg/kg)	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)	Corrosive Potential
B-27	8.5 - 10 13.5 - 15	5.5	< 29*	< 170*	< 47*	22,600	393	12.8	Low
B-30	8.5 - 10 13.5 - 15	4.4	< 30*	< 180*	< 47.4*	19,500	397	15.9	Low
B-31	14.5 - 15 18.5 - 20	4.4	< 30*	< 180*	< 47.1*	9,780	384	15.6	Low
B-34	8.5 - 10 13.5 - 15	5.2	< 30*	< 180*	< 45.9*	16,500	411	16.4	Low
B-36	13.5 - 15 18.5 - 20	4.7	< 30*	< 180*	< 46*	18,500	393	16.7	Low
B-37	13.5-14.5 14.5 - 15	2.7	< 11*	12000	< 54.5*	446	377	31.3	High
B-39	3.5 - 5 8.5 - 10	4.9	< 28*	< 170*	642	6,110	393	9.27	Low
B-43	13.5 - 15 18.5 - 20	4.4	< 29*	< 170*	< 44.4*	16,800	426	12.5	Low
B-44 B-45	13.5 - 15 13.5 - 15	4.1	< 29*	240	< 44.2*	14,800	461	13.2	Low
B-46	0 - 1.5 3.5 - 5	4.6	< 27*	< 160*	< 42.8*	11,500	437	7.22	Low
B-48	8.5 - 10 13.5 - 15	4.6	< 29*	< 170*	< 45.4*	15,100	426	12.4	Low
B-53	3.5 - 5 8.5 - 10	4.4	< 30*	< 180*	< 46.8*	16,400	425	16.3	Low
B-54	8.5 - 10 13.5 - 15	4.7	< 30*	< 180*	< 48*	25,200	427	16.5	Low
B-55	8.5 - 10 13.5 - 15	4.5	< 30*	< 180*	< 45.6*	18,900	441	16.0	Low
B-59	3.5 - 5 8.5 - 10	4.2	< 30*	< 180*	< 47.7*	17,000	387	15.7	Low
B-62 B-63	13.5 - 15 13.5 - 15	4.2	< 28*	< 170*	66.7	16,500	389	12.1	Low
B-64	8.5 - 10 13.5 - 15	5.1	< 30*	< 180*	< 47.0*	14,100	434	16.1	Low
B-66	8.5 - 10 13.5 - 15	5.0	< 29*	< 170*	< 45.8*	15,300	413	12.5	Low

Boring	Sample Depth (ft)	pH	Chlorides (mg/kg)	Sulfates (mg/kg)	Sulfides (mg/kg)	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)	Corrosive Potential
B-68	8.5 - 10 13.5 - 15	5.7	< 33*	480	< 50.7*	6,710	454	23.2	Low
B-69	13.5 - 15 18.5 - 20	6.0	< 30*	< 180*	< 48.6*	15,200	409	17.7	Low
B-73	8.5 - 10 13.5 - 15	4.9	< 30*	< 180*	< 50.0*	14,300	435	18.0	Low
B-74	8.5 - 10 13.5 - 15	4.5	< 31*	< 190*	< 50.5*	12,400	457	19.4	Low
B-77	18.5 - 20 23.5 - 25	3.6	< 32*	570	< 48.8*	3,590	497	22.3	Moderate
B-78	13.5 - 15 18.5 - 20	5.3	< 30*	< 180*	< 49.0*	24,600	438	16.9	Low
B-79	8.5 - 10 13.5 - 15	4.9	< 30*	< 180*	< 48.6*	17,100	457	16.7	Low
B-80	8.5 - 10 13.5 - 15	5.6	< 30*	< 180*	< 50.1*	18,100	376	17.8	Low
B-81	3.5 - 5 8.5 - 10	5.2	< 29*	< 170*	< 48.6*	16,500	380	13.0	Low

*Below indicated reporting limits

Based on AWWA C105/A21.5 (Polyethylene Encasement for Ductile-Iron Pipe Systems), the soils on this site generally do not appear to have a high corrosion potential based on the relatively neutral to slightly acidic pH readings, generally trace sulfide concentrations, moderate to high resistivity, and high redox potential. High to moderately corrosive soil samples were encountered in borings B-37 and B-77. Based on DIPRA's (Ductile Iron Pipe Research Association) "The Design Decision Model for Corrosion Control of Ductile Iron Pipelines" Figure 1, the site is categorized as Level 1, which recommends "Installing the pipe as-manufactured with its protective standard shop coating/annealing oxide system."

We are not aware of the existence of other corrosive factors such as coal, cinders, muck, peat, mine wastes, or landfills at this site, which would otherwise automatically categorize the site as highly corrosive and negate the test results. However, as discussed previously, a petroleum odor was noted in the sample collected at boring B-33 from a depth of 3.5 to 5 feet. Borings B-8, B-31 and B-37 encountered wood at depths ranging from 8.5 to 15 feet. Corrosivity tests were performed for the sample collected from B-37 which was found to be highly corrosive. However, tests were

not performed for the wood samples collected from B-8 and B-31. Therefore, in addition to B-37 additional protections may be necessary in the areas near B-8 and B-31.

5.0 ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the seventy-five (75) soil test borings performed by F&R, laboratory test results, our experience with similar projects and subsurface conditions, and the limited information provided to us regarding the proposed construction. It is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed construction from a geotechnical engineering perspective provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project.

5.2 MANHOLE FOUNDATION AND SEWER LINE SUPPORT

Based on our review of the project plans, it appears that open-cut construction will be used to install a majority of the proposed sewer line. The depth of the open-cut line will generally range from approximately 5 to 23 feet below the existing ground surface.

Based on the results of the test borings, it is anticipated that the manholes and sewer lines near borings B-10, B-11, B-21, B-38, B-45, B-54, B-56, B-64 to B-67, B-69, B-75, B-78 and B-79 will typically bear in wet/saturated, and/or very loose to loose sand or very soft to soft silts and clays. As such, loose/soft and/or unstable conditions could be encountered during construction in these areas.

Manholes and sewer lines near borings B-41, B-42 and B-46 are anticipated to encounter PWR during excavation. As such, difficult excavation should be anticipated in these areas.

In addition, groundwater was generally encountered in a majority of the borings up to about 1 to 19 feet *above* the proposed invert elevations. As such, wet and saturated soils should be anticipated during pipe installation, and dewatering will likely be necessary.

Given the presence of very soft and loose, wet/saturated soils, and groundwater above the invert elevations as indicated previously, some subgrade repair will likely be required to provide a stable base for construction of the proposed sewer lines and associated manholes.

We recommend that a qualified geotechnical engineer or his representative evaluate all of the trench and manhole excavations and bearing grades prior to sewer line or manhole placement. If soft or otherwise unsuitable soils are encountered at the trench or manhole bearing level, undercutting and repair of the bearing grades may be required and should be performed as directed by the project geotechnical engineer. If softened/saturated soils or standing water are

present at the trench bearing level, a layer of clean washed #57 stone may be recommended to provide a stable bedding for the pipe. The clean washed stone should be encased in geotextile fabric (Mirafi 140N or equivalent) in order to allow sump pumping out of the washed stone and help maintain lowered groundwater during pipe installation and backfilling operations.

5.3 LAUNCHING AND RECEIVING PITS

As previously indicated, we anticipate that launching and receiving pits will be used to install the sewer lines at the following locations:

i. Mariners Landing Drive from proposed manhole MH 75 to MH 76;
ii. Camden Road from proposed manhole MH 87 and MH 88; and
iii. King Road from about station 339+14.23 to proposed manhole MH 129.

Due to the anticipated excavation depths to the casing invert elevations, anticipated dimensions of the entry and receiving pits, and site constraints (*i.e.,* existing roads, private properties, etc.) temporary shoring will likely be required for each of the crossings as will be discussed in a subsequent section of this report.

We recommend that a qualified geotechnical engineer or his representative evaluate all of the entry and receiving pit excavations prior to water line installation. If loose/soft or otherwise unsuitable soils are encountered at the pit bearing level, undercutting and repair of the bearing grades may be required and should be performed as directed by the project geotechnical engineer. If softened/saturated soils or standing water are present at the pit bearing level, it is anticipated that undercut depths of 1 to 2 feet below pit subgrade elevation would be sufficient. The undercut should be backfilled with a layer of clean washed #57 stone to provide a stable work area. The clean washed stone should be encased in geotextile fabric (Mirafi 140N or equivalent) in order to allow sump pumping out of the washed stone and help maintain lowered groundwater during pipe installation and backfilling operations.

i. Mariners Landing Drive

The proposed sewer line will enter Mariners Landing Drive from Lake Firm road by, a 35 foot by 20 foot bore pit proposed to be located just east of Mariners Landing Drive (at proposed manhole MH 75, station 201+66.80), and a 20 foot by 20 foot receiving pit is proposed on Mariners Landing Drive (at proposed manhole MH 76, station 204+80.68). The bore and receiving pits depth will be approximately 26 and 27 feet, respectively. Based on the results of the test boring (B-37) performed near the receiving pit location, it is anticipated that the casing will typically be installed through moist to wet, loose to dense sands and very stiff highly plastic silts. It should be noted that a soil boring was not performed near the bore pit location since permission to access the property was not obtained. Based on the closes boring (B-36A) performed in the vicinity of the bore pit, it is anticipated that some very hard to very dense soils will likely be encountered. As

such, it is anticipated that the pits will extend through soil materials and hard/difficult excavation materials could be encountered during the trenchless installation activities.

The entry and receiving pit bearing grades are anticipated to consist of wet dense sand. As such, soft and/or unstable subgrade conditions will not likely be encountered and subgrade repair will likely not be required.

The launching and receiving pit excavations will likely reach an elevation of about EL 114 and 115, respectively which are about 15 to 17 feet below the stabilized groundwater level. Therefore, it is likely that dewatering measures will be required.

ii. Camden Road Crossing

The sewer line will cross Camden Road near Northbank Street by, a 20 foot by 20 foot receiving pit proposed to be on the south side of the road (at proposed manhole MH 88, station 229+11.47) and a 20 foot by 40 foot launching pit proposed to be on the north side of Camden Road (at proposed manhole MH 87, station 226+18.74). The depths of the launching and receiving pits are approximately 15 and 25 feet, respectively. Based on the results of the test borings (B-41 and B-42) performed near the pits, it is anticipated that the casings will typically be installed through moist to wet, very loose to dense sands, soft to hard silts and PWR. As such, hard/difficult excavation materials will likely be encountered during the trenchless installation activities.

The launching and receiving pit bearing grades are anticipated to consist of very hard silts and very dense silty sands, respectively. As such, soft and/or unstable subgrade conditions are not anticipated and subgrade repair will likely not be required in this area.

The launching pit excavation will likely reach about EL 120 feet, which is about 17 feet below the groundwater level. The receiving pit excavation will likely reach an elevation of about EL 121 feet, which is about 13 feet below the stabilized groundwater level. Therefore, it is likely that dewatering measures will be required.

iii. King Road Crossing

To cross King Road, a 20 foot by 40 foot launching pit is proposed on the south side of King Road, and a 20 foot by 20 foot receiving pit is proposed on the north side of King Road. The depths of the launching and receiving pits will be approximately 17 and 16 feet, respectively. Based on the results of the test borings (B-62 and B-63), it is anticipated that the casings will typically be installed through moist to wet, loose to very dense sands and moist, hard silts. As such, it is anticipated that hard/difficult excavation materials could be encountered during the trenchless installation activities.

The launching and receiving pit bearing grades are anticipated to consist of dense clayey sands. As such, soft and/or unstable subgrade conditions are not anticipated and subgrade repair will likely not be required in this area.

The receiving pit excavation will likely reach about EL 146 feet, which is about 15 feet below the stabilized groundwater level. The launching pit excavation will likely reach an elevation of about EL 145, which is about 15.5 feet below the stabilized groundwater level. Therefore, it is likely that dewatering measures will be required.

5.4 STRUCTURAL FILL PLACEMENT AND COMPACTION

It is expected that the low-plasticity on-site cut soils (SM, SC, SP, ML & CL) will be suitable for use as structural fill/backfill material provided they are at a moisture content suitable to achieve proper compaction and are stable during compaction and at final subgrade. These low to moderately plastic soils are generally considered fair to good materials for use as structural earth fill. However, as previously indicated, a majority of these soils that are excavated during utility construction will likely be wet or saturated. Depending upon the cut depths and site conditions at the time of construction, these soils may require moisture conditioning (*e.g.*, drying of wet soils) prior to use as structural fill. As such, it is recommended that earthwork be performed during the summer months when the weather conditions are more conducive to moisture conditioning of fill materials. If earthwork is performed during the seasonally-wet months, additional subgrade undercutting and repair will likely be required and it may be difficult to properly compact structural fill.

Highly plastic clays and silts (CH and MH) were encountered in about 1/3 of the borings above the proposed excavation depths. These soils are considered poor materials for re-use as structural fill/backfill because they can become unstable and be difficult to properly place and compact.

A petroleum odor was noted in the sample collected at boring B-33 from a depth of 3.5 to 5 feet. Borings B-8, B-31 and B-37 encountered wood samples at depths ranging from 8.5 to 15 feet. These soils, which contain deleterious materials, are typically considered unsuitable for reuse as structural fill or backfill and are generally recommended to be wasted, and imported soils required. Therefore, we do not recommend that materials encountered in borings B-8, B-31, B-33 and B-37 be reused as backfill material. However, since these borings are located within a non-structural portion of the sewer alignment, the deleterious materials may be used as backfill near this location provided the owner is willing to accept some risk that these materials will not be able to be properly compacted, could settle over time, and could damage the pipe if the materials are placed and compacted directly over the pipe.

If imported soils are determined to be necessary, F&R recommends that a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer approve the suitability of the imported soils prior to their delivery to the site. Imported structural

fill should consist of low plasticity soil (LL<35, PI<20), have a maximum dry density of at least 100 pcf, and be free or organic and other deleterious materials.

All structural earth fill should be compacted at a moisture content within ±3 percent of the optimum moisture content and placed in loose lifts not exceeding 8 inches. All structural earth fill (*i.e.,* fill placed in roads, parking lots, and driveways) should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D-698 and 100 percent in the top 12 inches. Structural earth fill placed in non-structural/grassy areas should be compacted to at least 92 percent of the standard Proctor maximum dry density.

All structural fill material should be placed and compacted under the full-time control and supervision of a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer. The placement and compaction of all fill material should be tested at frequent intervals in order to confirm that the recommended degree of compaction is achieved.

As previously stated, the on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (*i.e.,* pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than three percent above the optimum moisture content are generally considered to have excessive moisture. During earthwork and construction activities, surface-water runoff must be drained away from construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades.

Exposure to the environment may weaken the soils at the bearing level if excavations remain open for long periods of time. The bearing surfaces should be level or suitably-benched and free of loose soil, ponded water, and debris. If the bearing soils are softened by surface water intrusion, subsurface seepage or exposure, the softened soils should be removed from the excavation immediately prior to placement of stone, concrete, or other pipe bedding materials.

5.5 DEWATERING

As previously mentioned, groundwater was generally encountered up to about 1 to 19 feet *above* the proposed invert elevations at a majority of the borings. Therefore, it is anticipated that groundwater will be encountered during sewer construction, and dewatering will be required in order to maintain drained, stable excavations and to prevent softening/loosening of the excavation subgrades. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottoms of the excavations. However, groundwater elevations will likely vary throughout the year, and will be elevated especially during the seasonally-wet months (October through April). If groundwater is encountered, dewatering may be able to be handled by sump and pumping techniques. However during periods of inclement weather, sump pits and pumping may not be sufficient to control both groundwater and surface water, and more extensive

drainage/dewatering measures may be required. The method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, creek diversion, coffer dams, sheet piling, or other means.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavations during construction, unstable and loosened subgrade conditions could develop, which may cause excessive settlements to develop beneath the completed structures or require additional subgrade repair (*e.g.,* densification, undercutting & replacement with washed stone, etc.). Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels during construction. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

5.6 EXCAVATION CHARACTERISTICS

Based on the provided preliminary plans and our test boring results, borings B-41, B-42 and B-46 encountered PWR at about 1 to 4 feet *above* the approximate invert elevations. Therefore, PWR excavation will likely be required in these areas. We anticipate that at rest of the site the open-cut excavations above 20 feet can be excavated using conventional backhoes, tracked excavators, and boring machines. A majority of these soils consisted of very loose to dense sands and very soft to hard silts and clays. It is anticipated that difficult excavation will likely be encountered during the excavation of the entry or receiving pits or during the jack and bore activities.

Removal of softer PWR (*i.e.,* PWR with N-values of 50/4" to 50/6") from confined excavations may be able to be accomplished using a large track hoe (*e.g.,* CAT 330 with new rock teeth); however, excavation will likely be slow and light blasting is typically performed to pre-loosen the PWR. Removal of harder PWR (*i.e.*, PWR with N-values of 50/0" to 50/3") and hard rock in confined excavations will not likely be possible with conventional equipment and typically requires blasting. The speed and ease of PWR excavation will depend upon the equipment utilized, experience of the equipment operators, and geologic structure of the PWR and rock. It may be possible to utilize a ram-hoe attachment on a large backhoe in lieu of blasting to pre-loosen rock for removal depending on the hardness of the rock and type of excavation equipment utilized.

5.7 TEMPORARY EXCAVATION RECOMMENDATIONS

Due to excavations reaching approximately 15 feet or greater in depth at some locations and to limit disturbance to the neighboring properties, we anticipate that the excavations may not be able to be sufficiently sloped and will require temporary shoring. Trench boxes or internally-braced excavations are anticipated; however, the type of excavation stabilization or shoring system used should be selected and designed by the contractor. It should be noted that excavations will extend through and into PWR, soft and loose soils, wet and saturated soils, and below the groundwater table, and flatter side slopes and/or special excavation or stabilization systems may be required.

Mass excavations and other excavations required for construction of this project should be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations), or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested by the owner, designer, or contractor's "competent person".

6.0 CONTINUATION OF SERVICES

As previously discussed, the Geotechnical Engineer of Record should be retained to monitor and test earthwork activities. It should be noted that the actual soil conditions at the various subgrade levels and bearing grades will vary across this site and thus the presence of the Geotechnical Engineer and/or his representative during construction will serve to validate the subsurface conditions and recommendations presented in this report.

We recommend that F&R be employed to monitor the earthwork and utility construction, and to report that the recommendations contained in this report are completed in a satisfactory manner. Our continued involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before installing sewer lines and manholes and before placing structural fill; and
- Observe the placement and compaction of structural fill and backfill, and perform laboratory and field compaction testing of the fill.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of WK Dickson and/or their agents, for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the subsurface exploration program, and generally-accepted geotechnical engineering practices. The evaluations and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

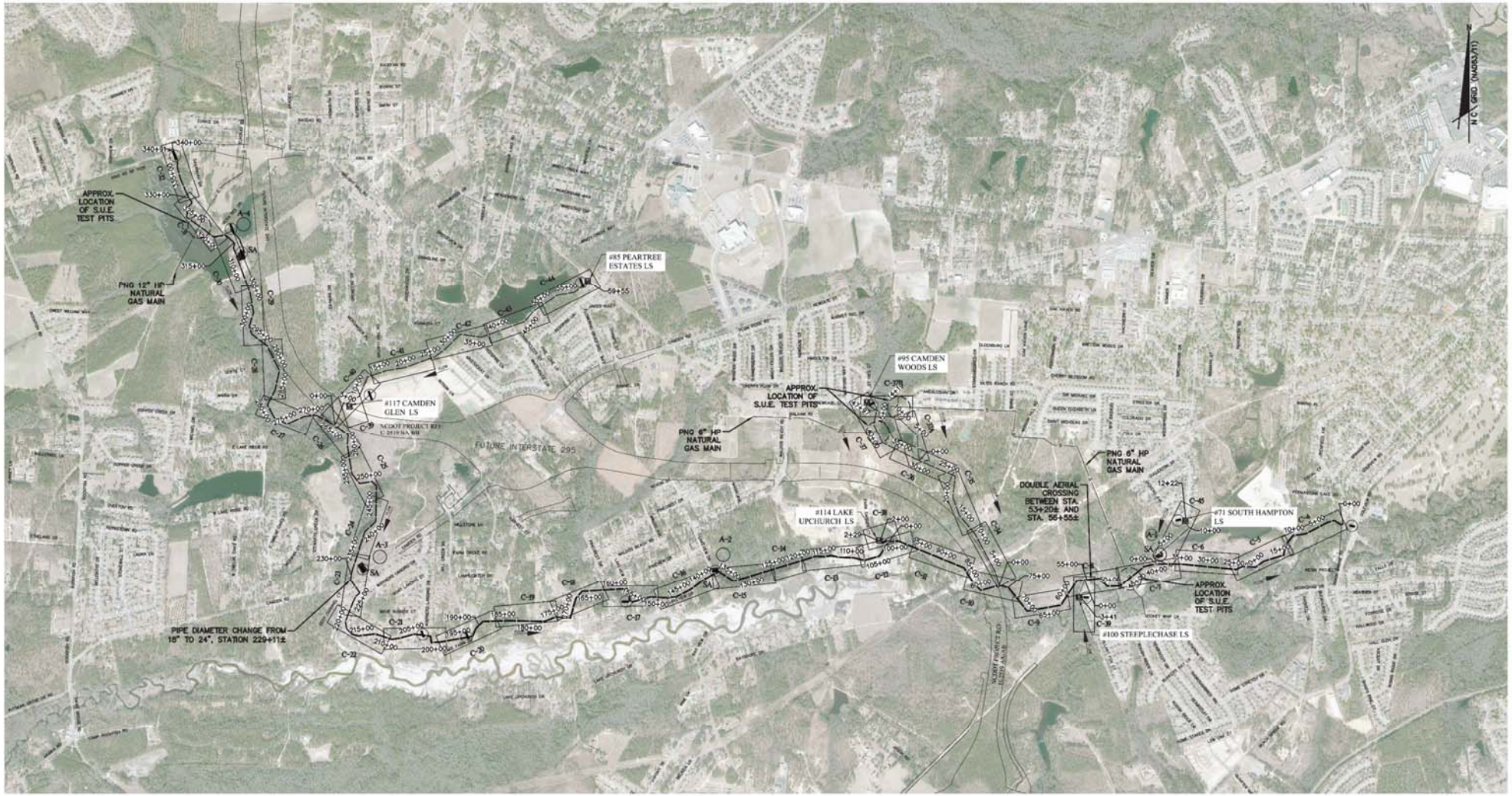
There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork activities to observe that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the proposed construction, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES



PLAN LEGEND

- A-1 — MAJOR ACCESS/STAGING AREA SHEET No.
- C-7 — PLAN AND PROFILE SHEET No.
- TEMPORARY GRAVEL CONSTRUCTION ACCESS
- SA — TEMPORARY STAGING AREA
- WETLANDS
- APPROXIMATE LOCATION OF S.U.E. TEST PITS

ALIGNMENT	STATION	PIPE DIAMETER
BRCO	0+00 – 229+11	24"
BRCO	229+11 – 340+91	18"
CAMDEN WOODS LS	0+00 – 47+97	12"
CAMDEN WOODS OFFSHOOT	0+00 – 14+19	8"
LAKE UPCHURCH LS	0+00 – 2+25	8"
CAMDEN GLENN LS	0+00 – 0+23	8"
STEEPLECHASE LS	0+00 – 3+40	12"
PEARTREE ESTATE LS	0+00 – 59+55	12"
SOUTH HAMPTON LS	0+00 – 12+22	8"

PLAN
HORIZ: 1"=1000'

1000' 0 1000' 2000'
SCALE: 1"=1000' (Horiz.)

Big Rockfish Creek Outfall

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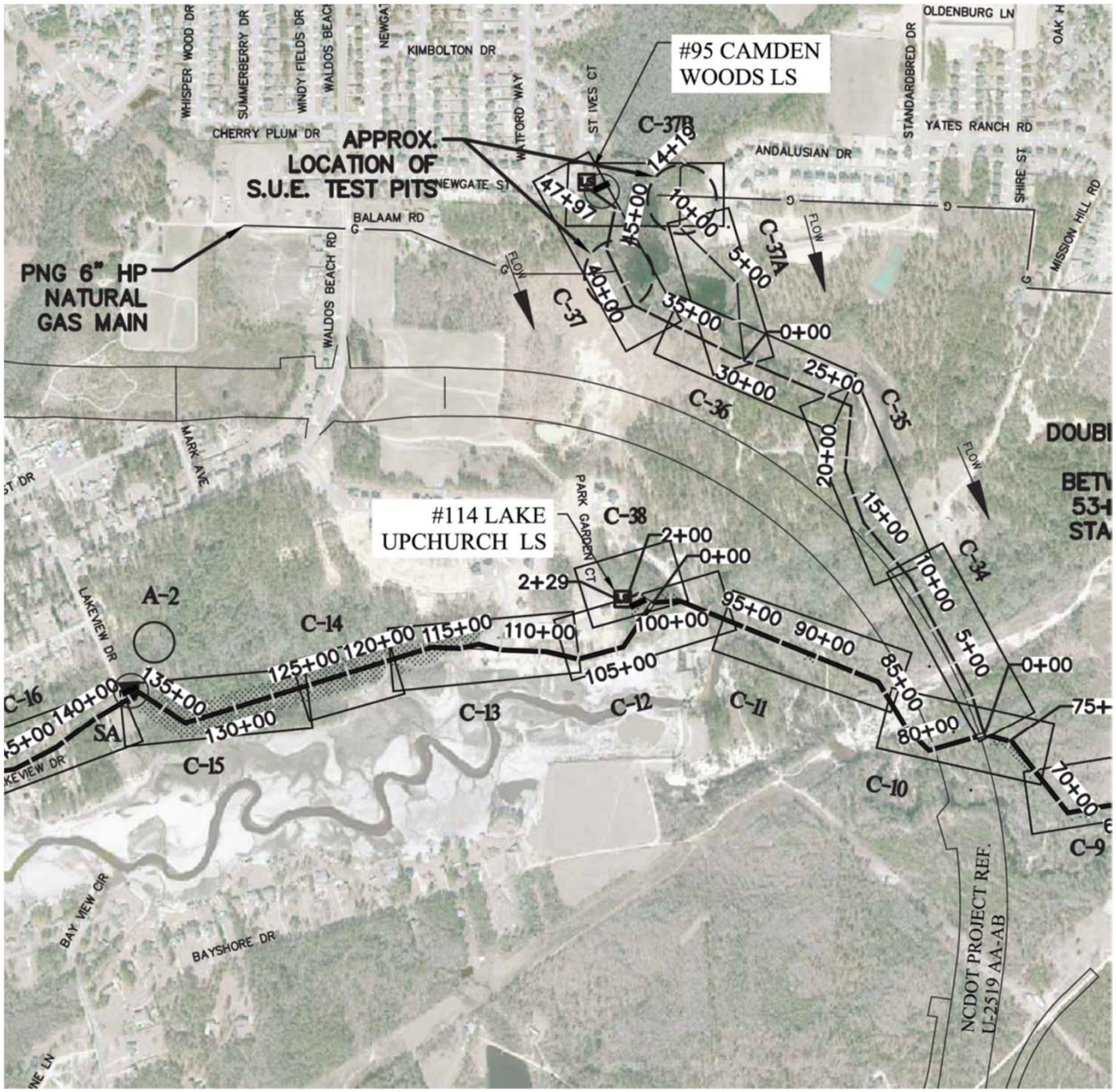
SITE VICINITY MAP

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 1A
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Camden Woods and Lake Upchurch LS Connections

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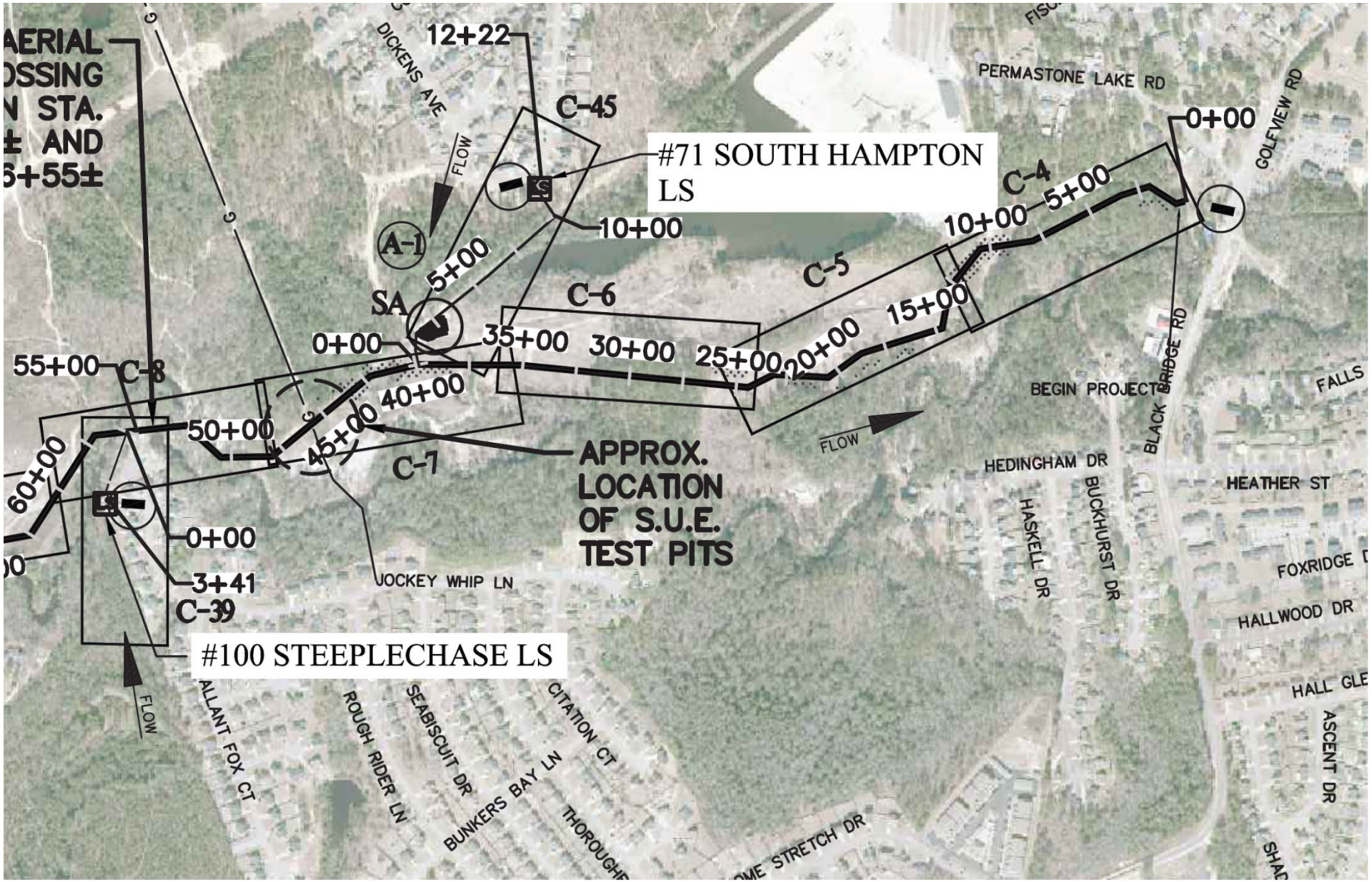
SITE VICINITY MAP

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 1B
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to Scale	



Steeplechase and South Hampton LS Connections

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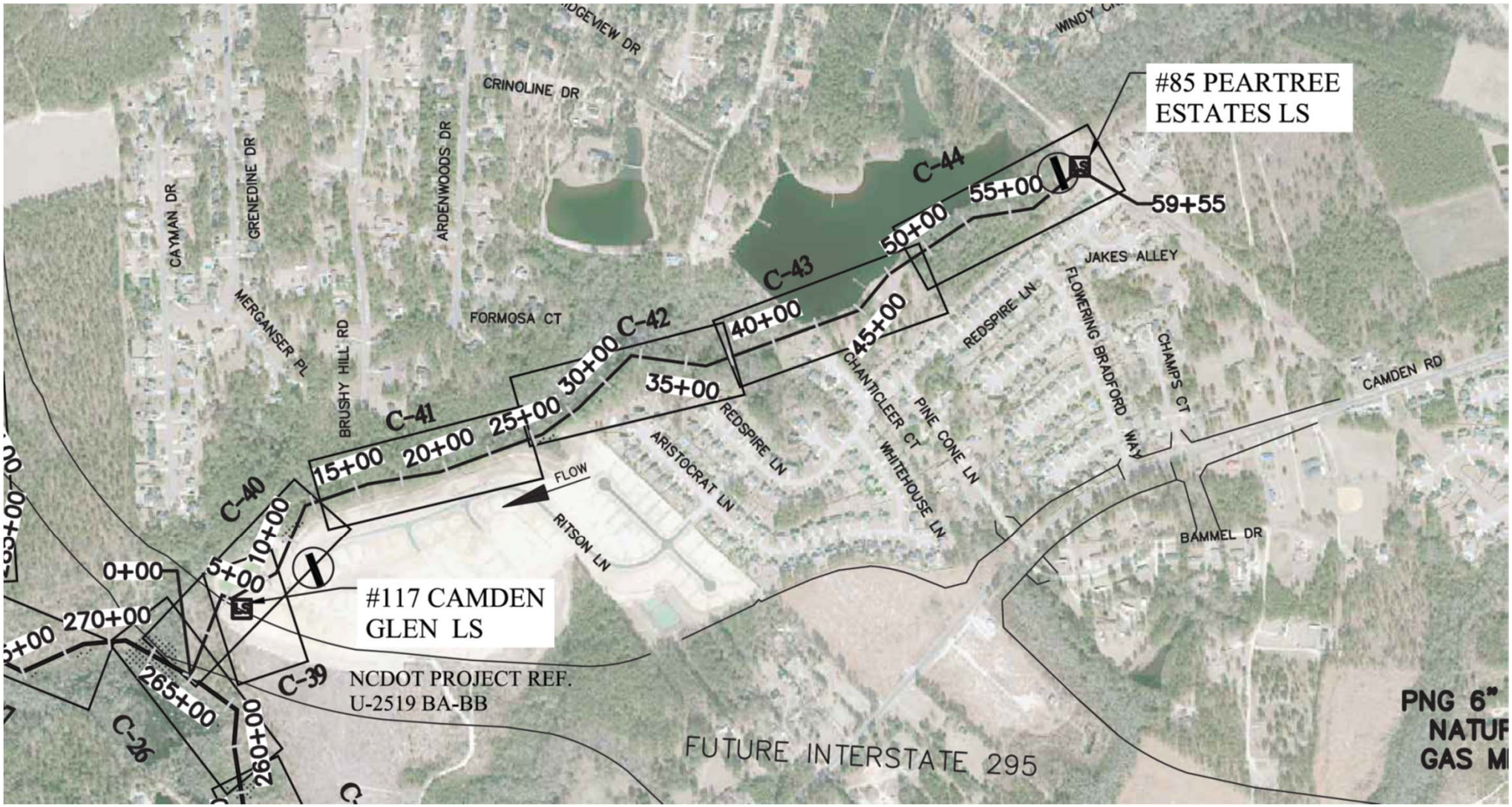
SITE VICINITY MAP

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 1C
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to Scale	



Camden Glen and Peartree Estates LS Connections

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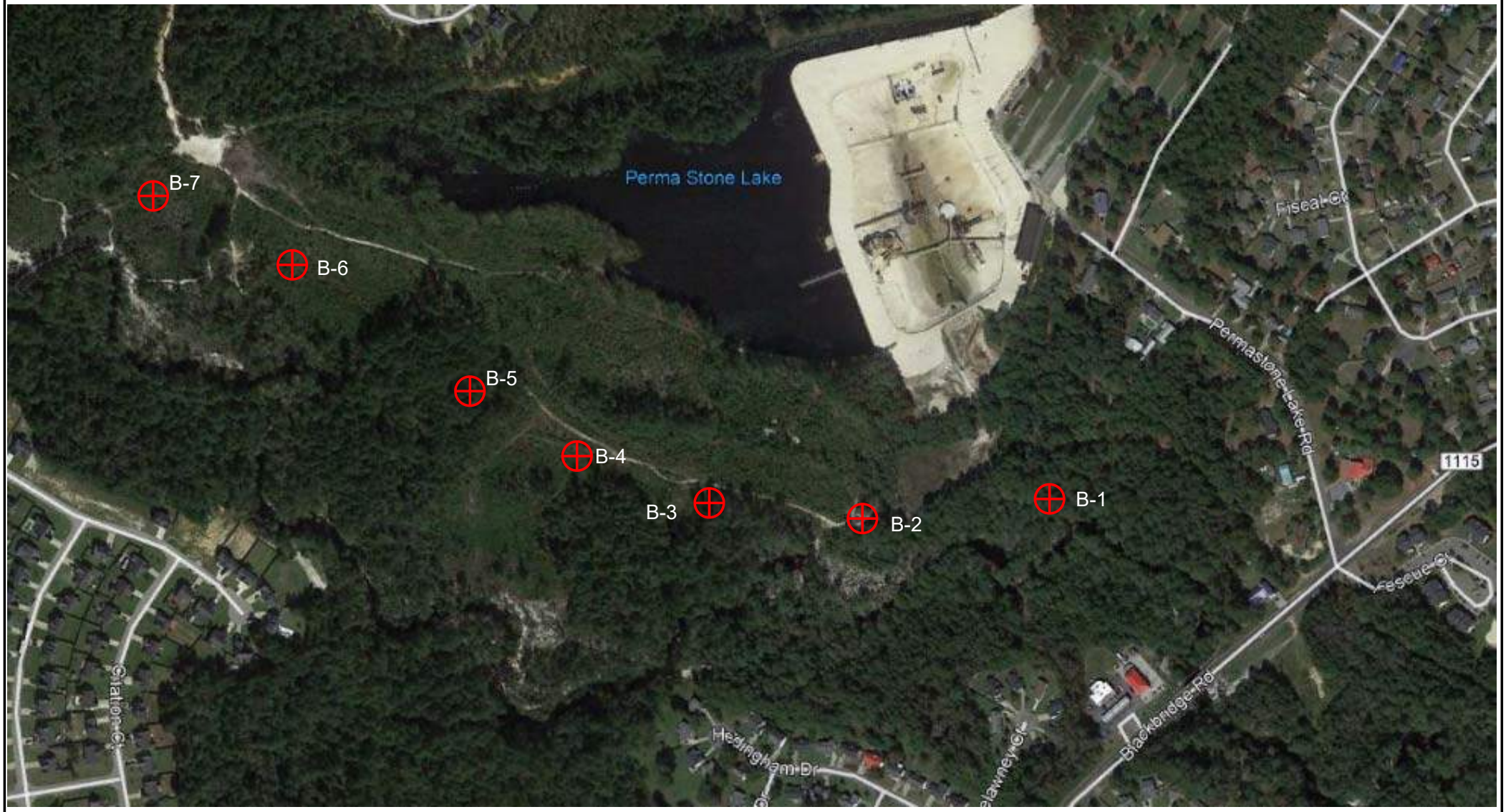
SITE VICINITY MAP

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 1D
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to Scale	



Big Rockfish Creek Outfall

⊕ Approximate Boring Location

N

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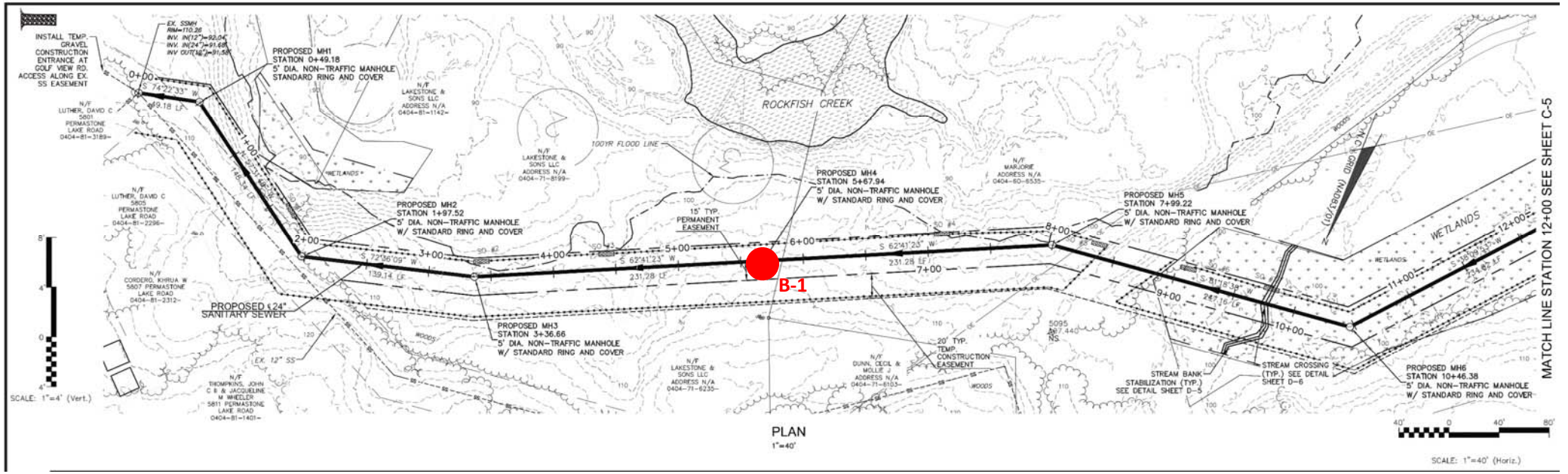
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2A
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

● Approximate Boring Location

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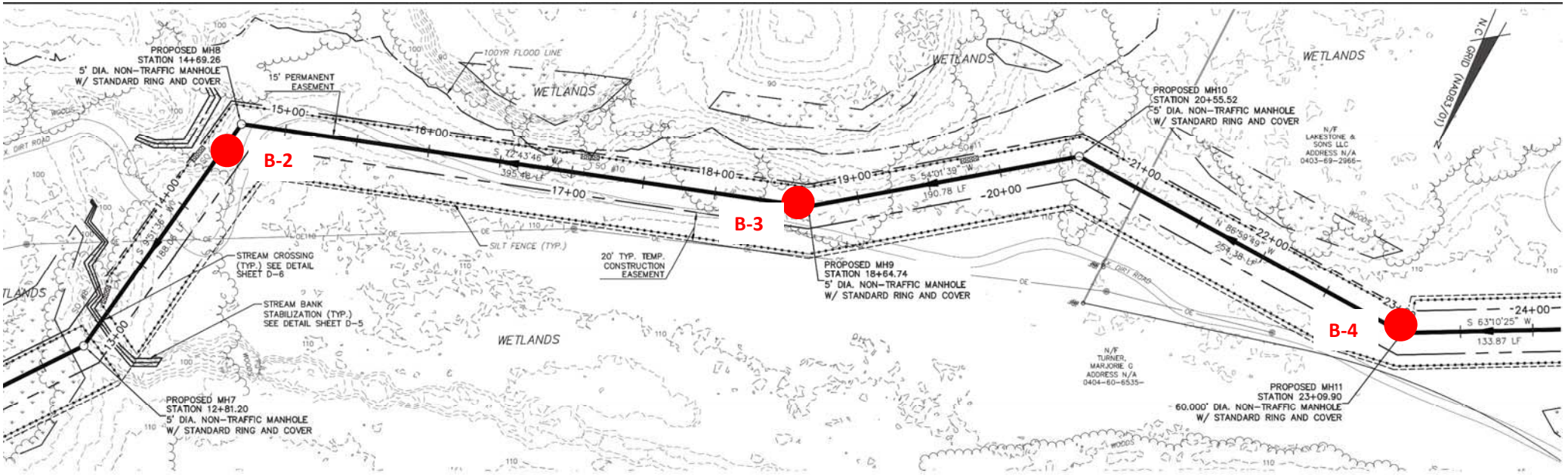
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2B
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



PLAN
1"=40'

SCALE: 1"=40' (Horiz.)

SCALE: 1"=4' (Vert.)

Big Rockfish Creek Outfall

● Approximate Boring Location

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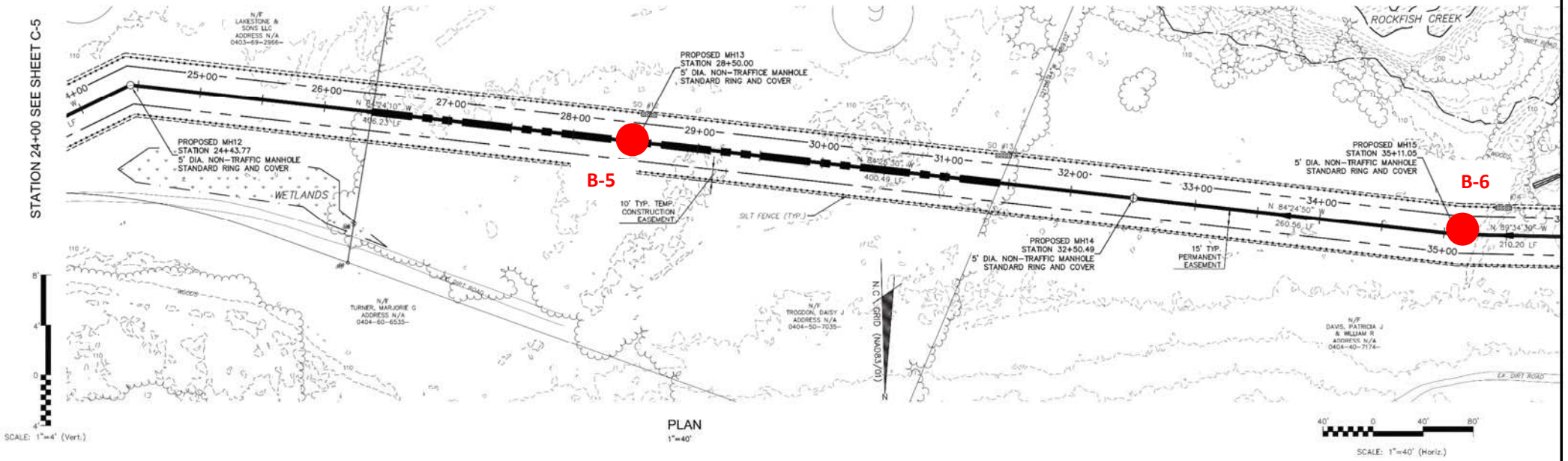
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2C
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2D
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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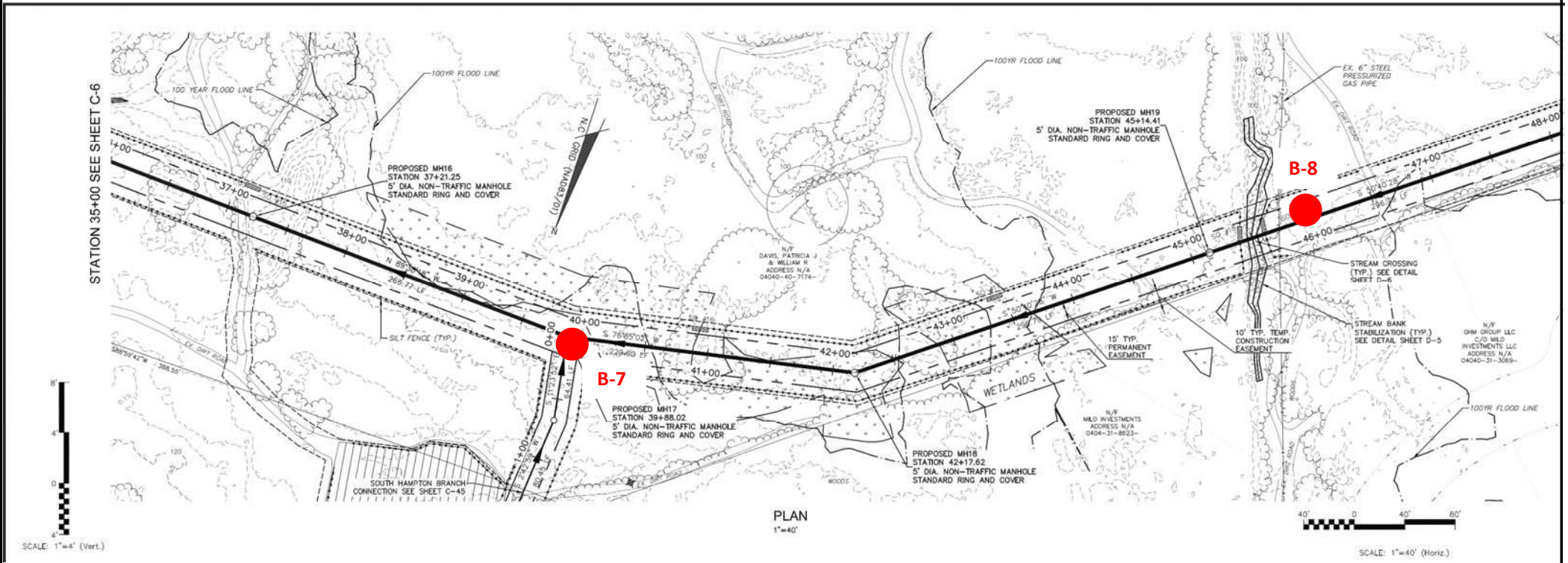
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2E
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

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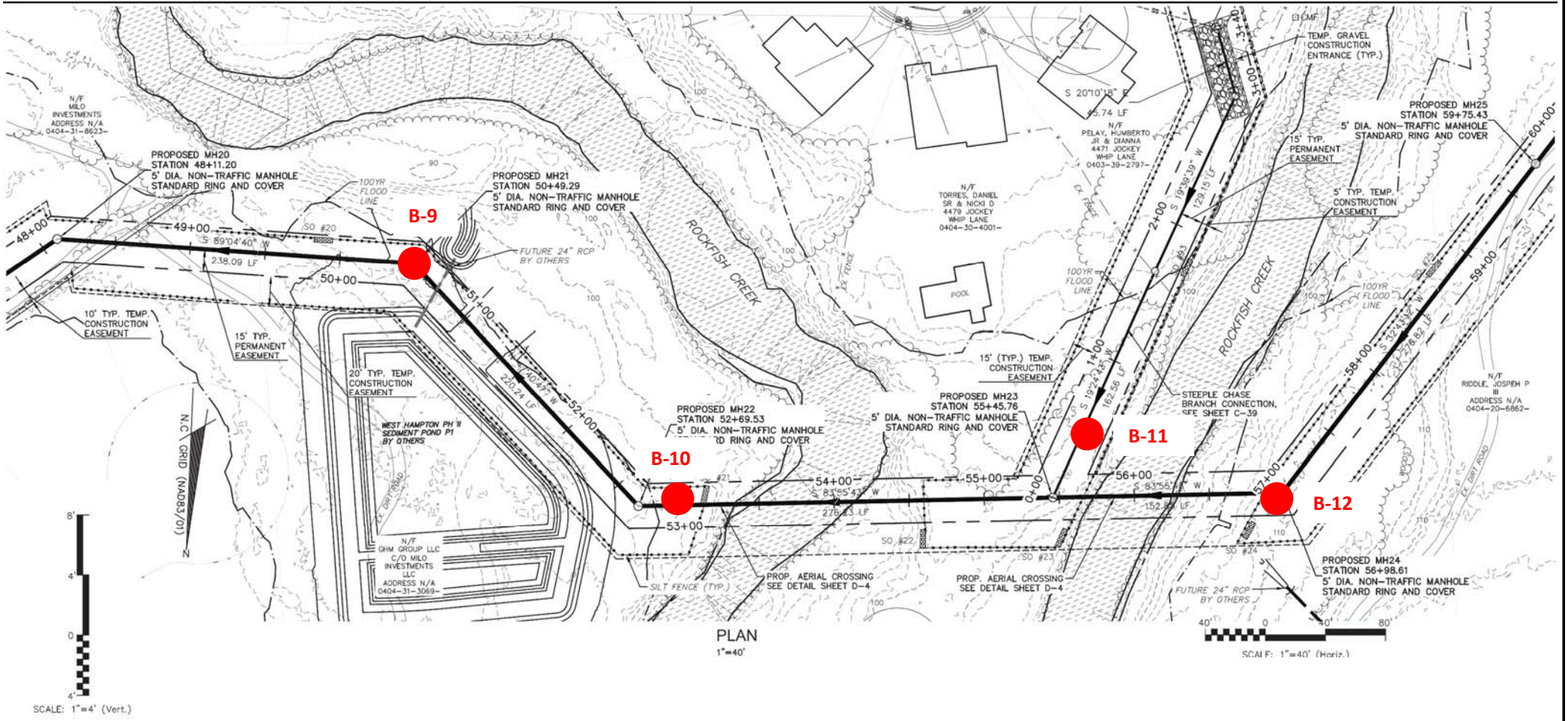
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2F
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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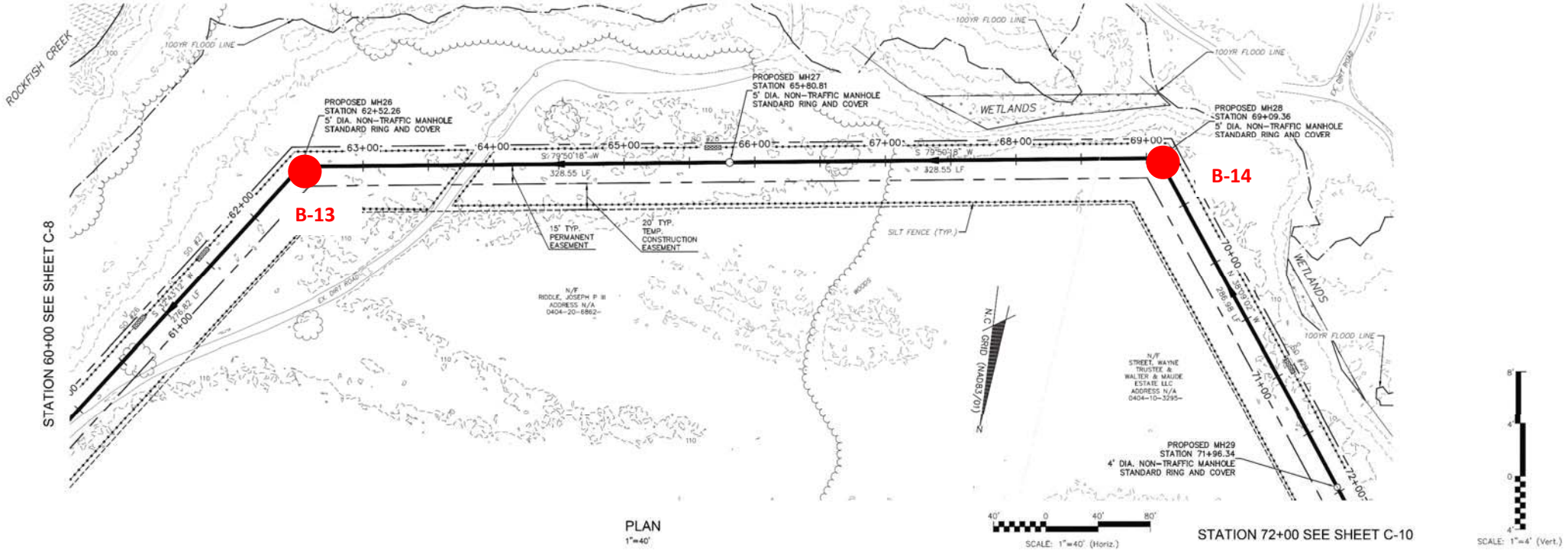
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2G
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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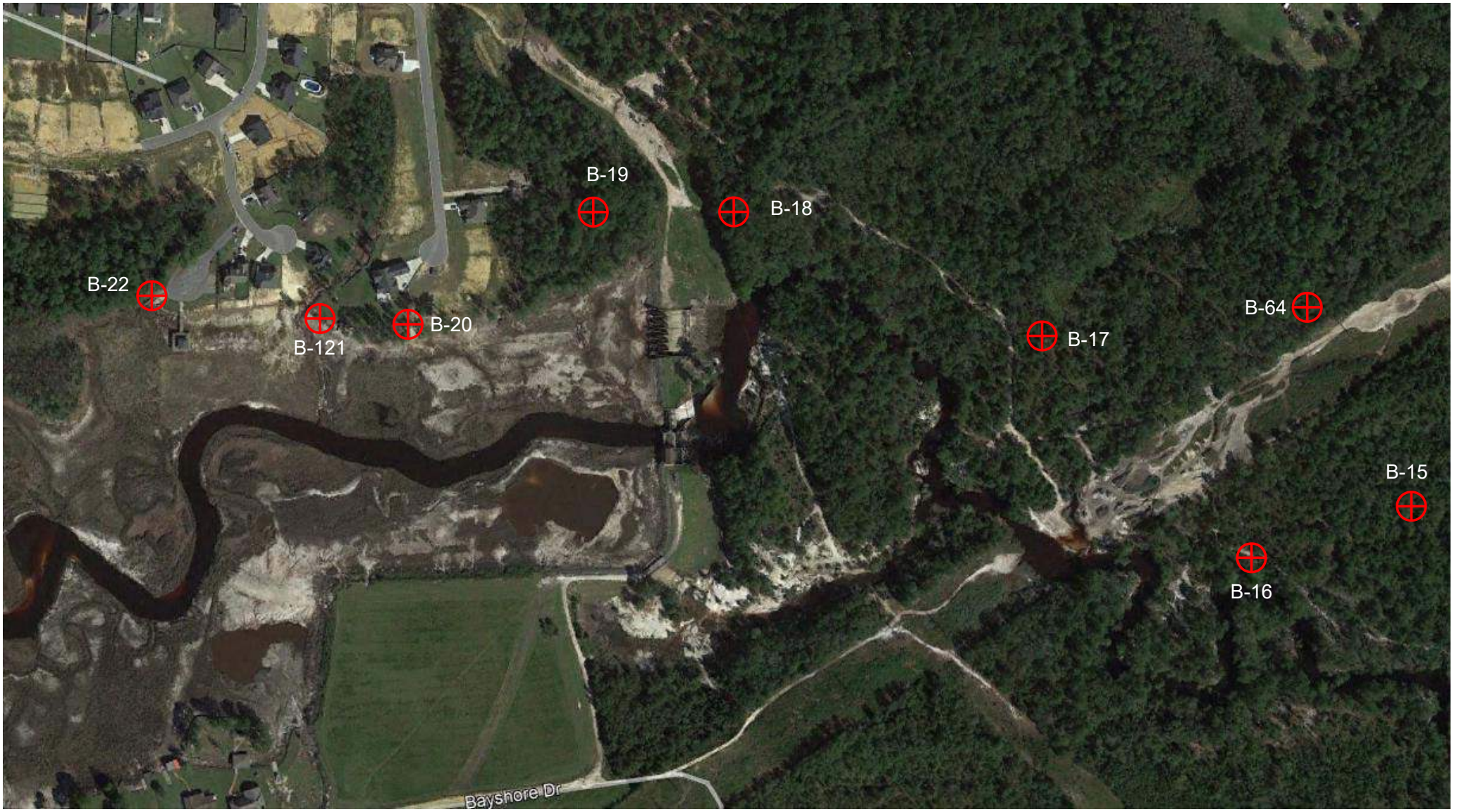
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2H
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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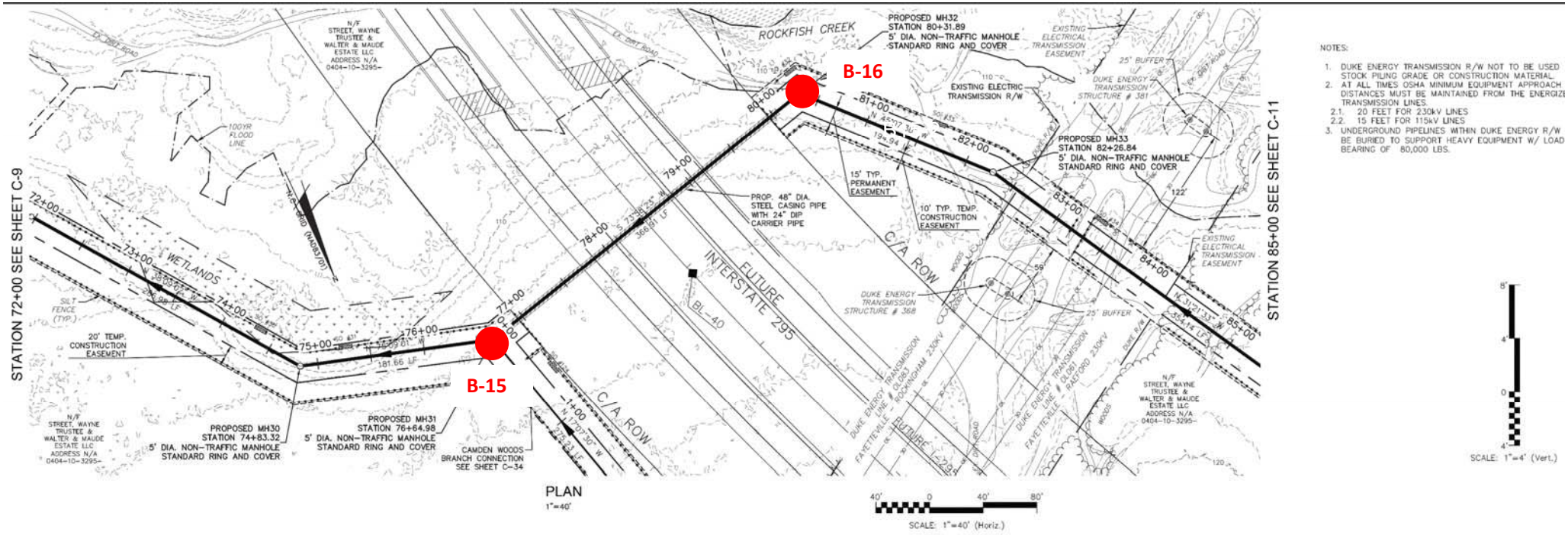
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Hope Mills, North Carolina	
F&R PROJECT No: 66W-0027	
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: August 2019	SCALE: Not to scale

FIGURE No.: 2I



NOTES:

1. DUKE ENERGY TRANSMISSION R/W NOT TO BE USED STOCK PILING GRADE OR CONSTRUCTION MATERIAL.
2. AT ALL TIMES OSHA MINIMUM EQUIPMENT APPROACH DISTANCES MUST BE MAINTAINED FROM THE ENERGIZE TRANSMISSION LINES.
   2.1. 20 FEET FOR 230kV LINES
   2.2. 15 FEET FOR 115kV LINES
3. UNDERGROUND PIPELINES WITHIN DUKE ENERGY R/W BE BURIED TO SUPPORT HEAVY EQUIPMENT W/ LOAD BEARING OF 80,000 LBS.

Big Rockfish Creek Outfall

● Approximate Boring Location

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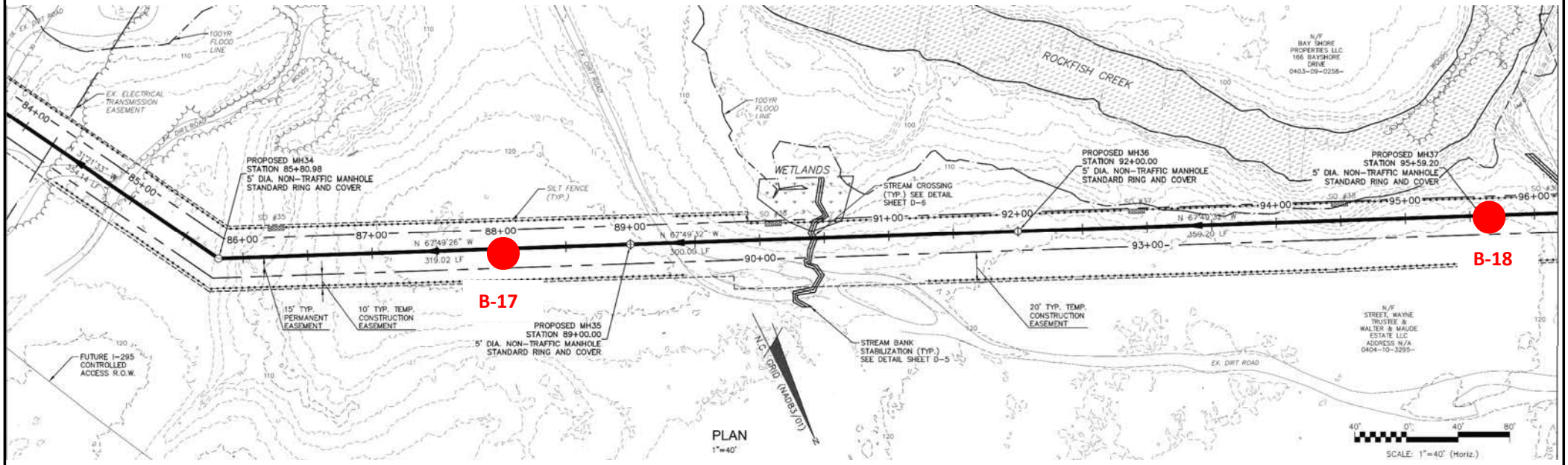
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2J
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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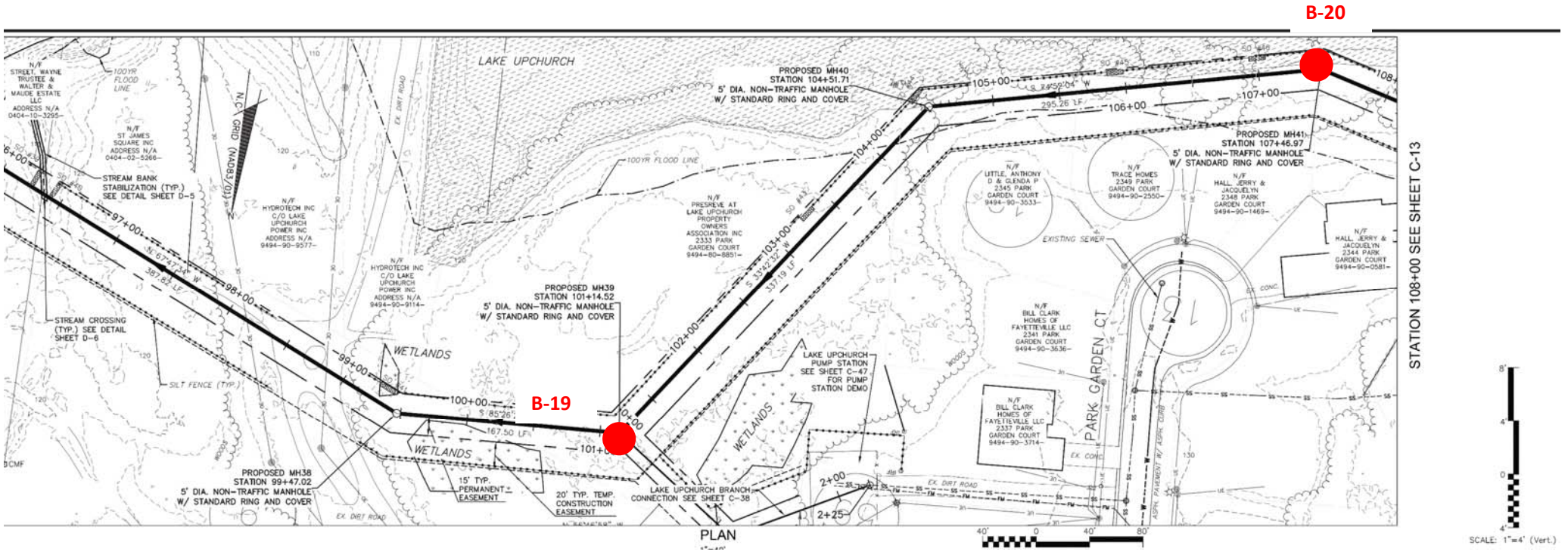
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Hope Mills, North Carolina	
F&R PROJECT No: 66W-0027	
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: August 2019	SCALE: As Shown

FIGURE No.: 2K



Big Rockfish Creek Outfall

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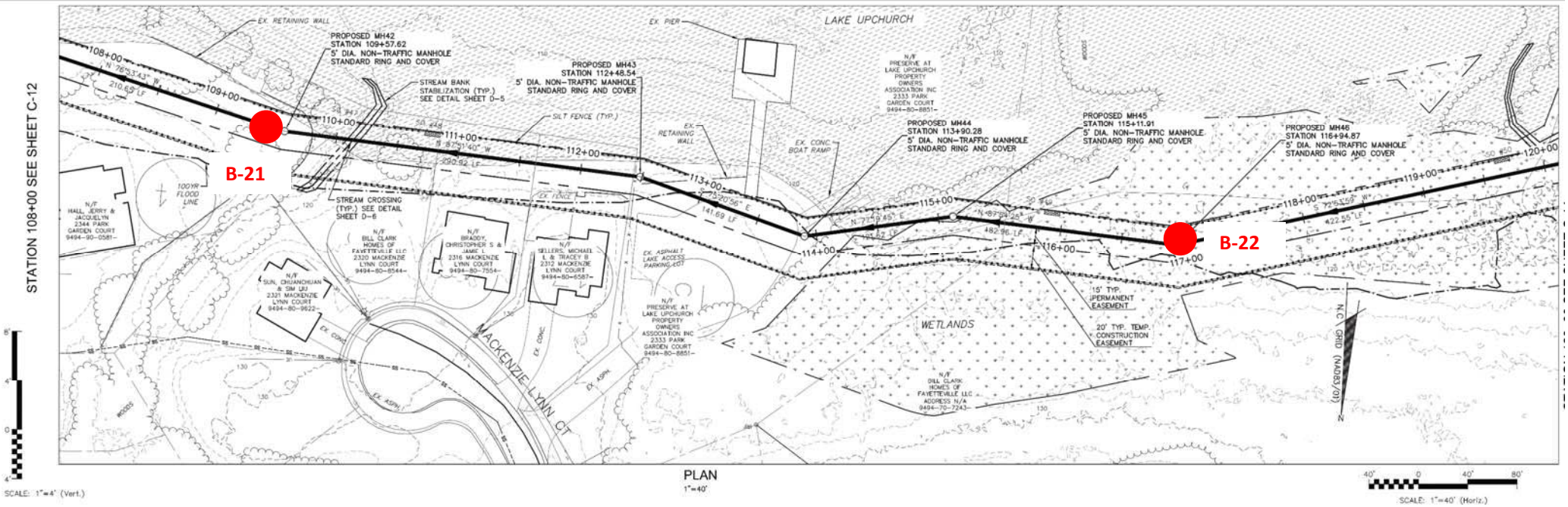
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2L
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2M
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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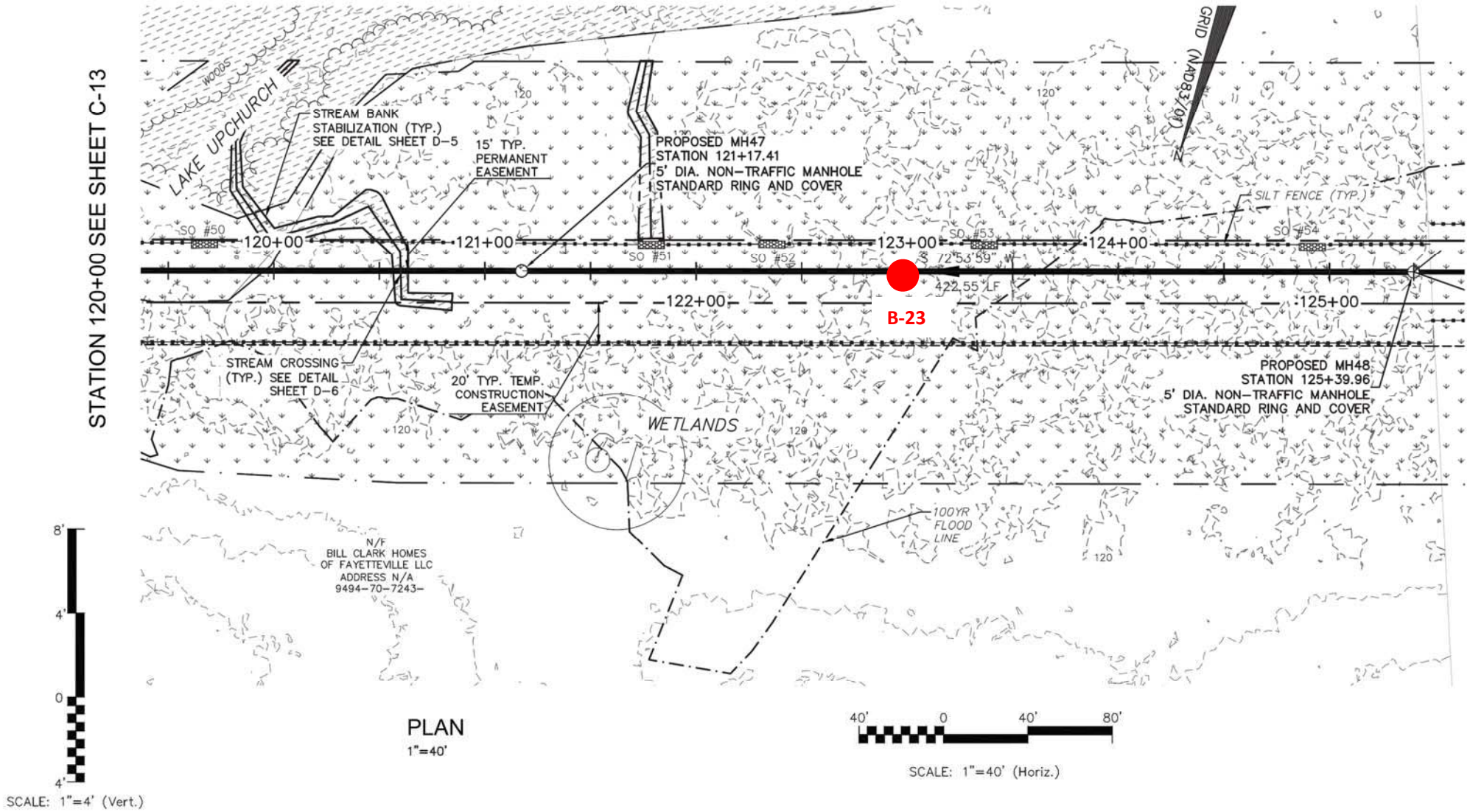
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2N
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

● Approximate Boring Location

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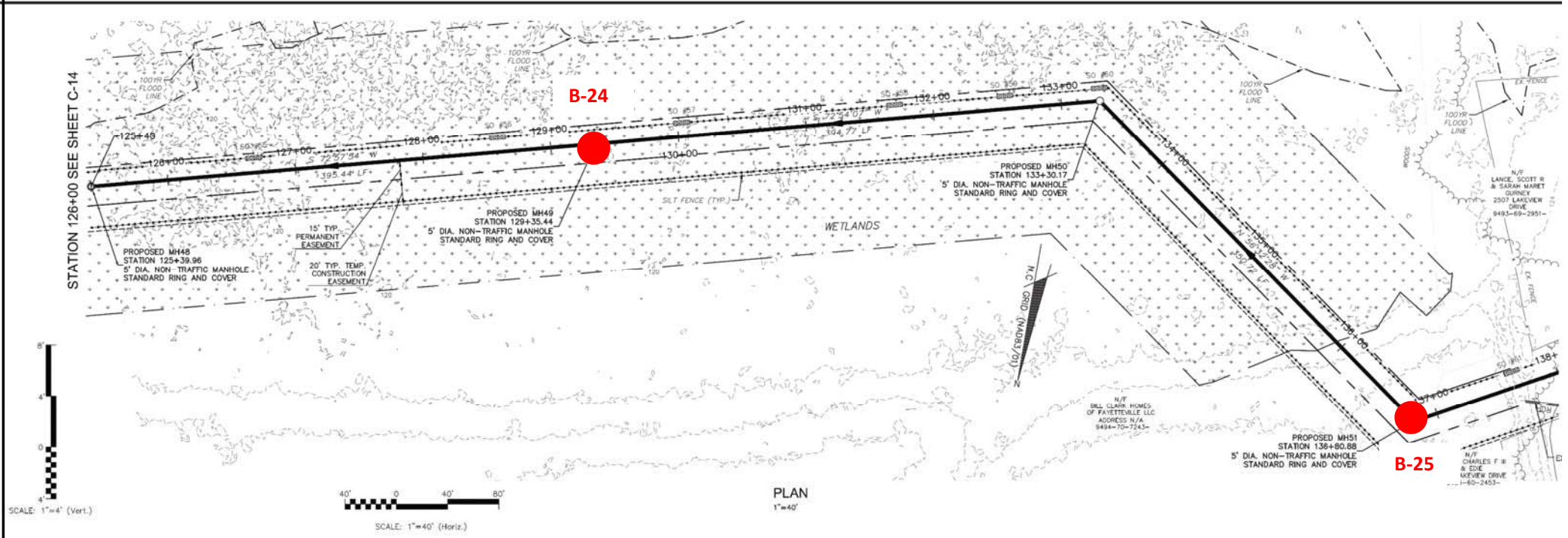
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 20
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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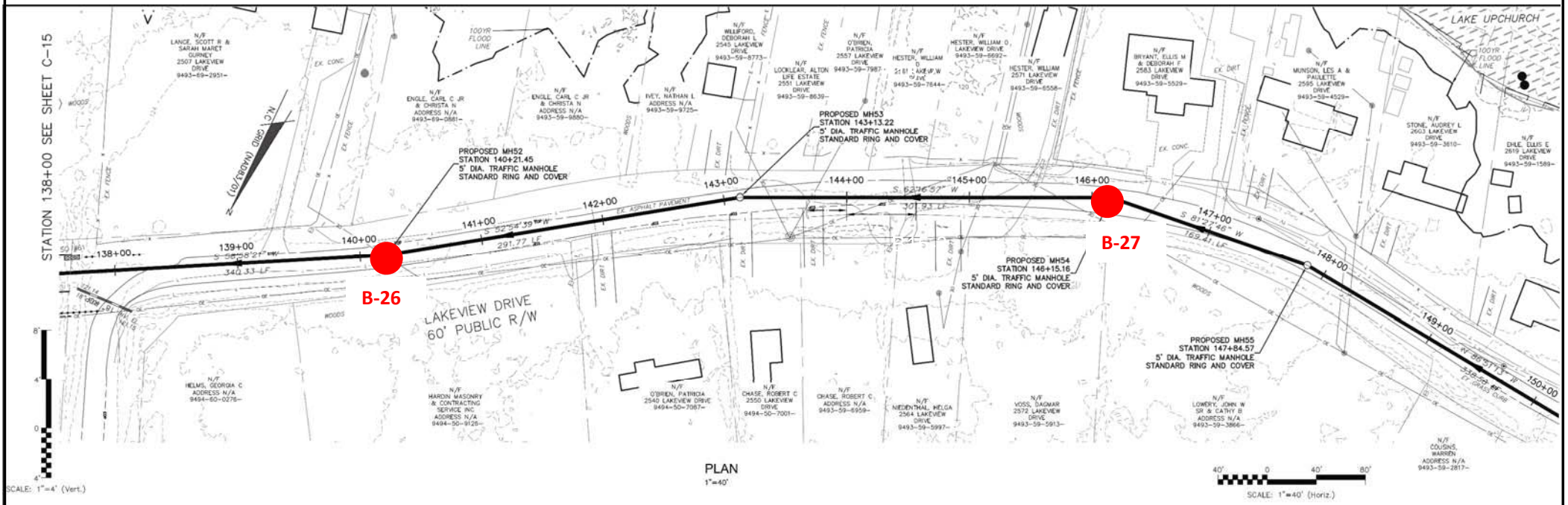
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2P
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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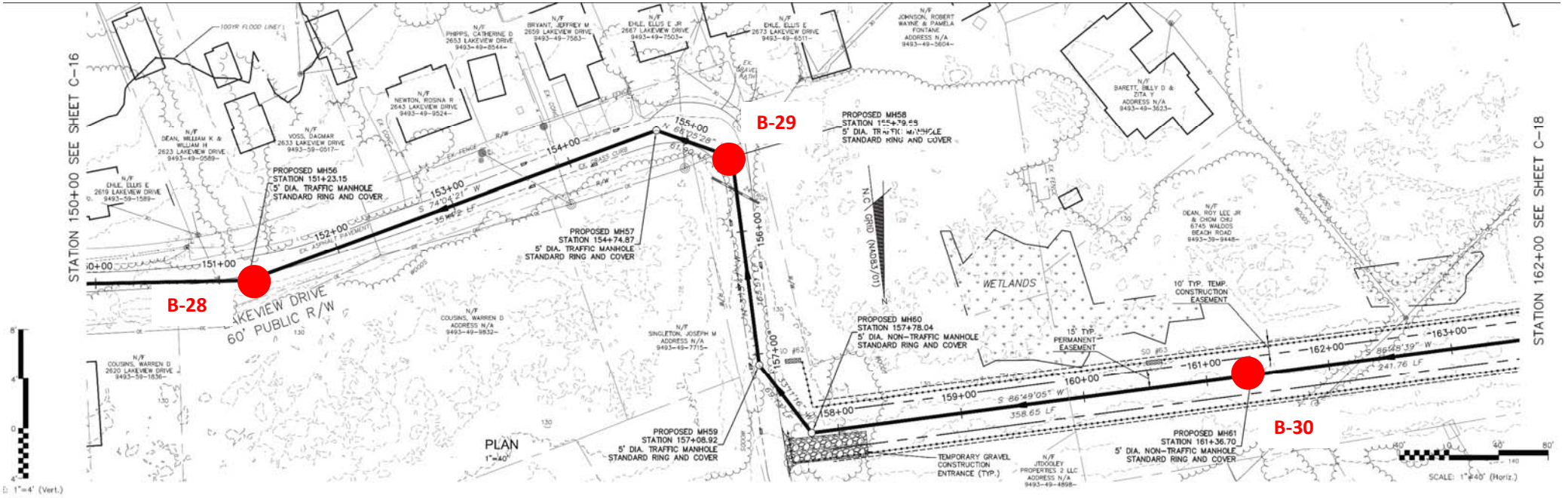
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Hope Mills, North Carolina	
F&R PROJECT No: 66W-0027	
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: August 2019	SCALE: As Shown

FIGURE No.: 2



Big Rockfish Creek Outfall

● Approximate Boring Location

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2R
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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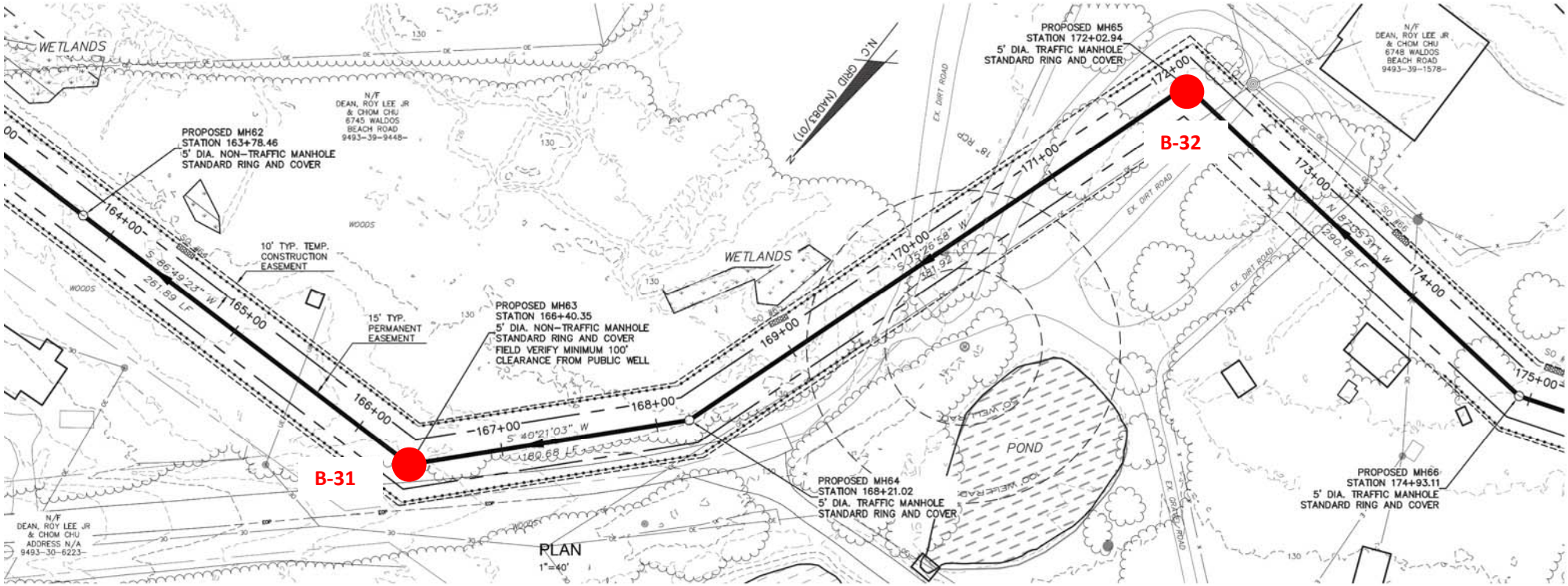
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2S
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

● Approximate Boring Location

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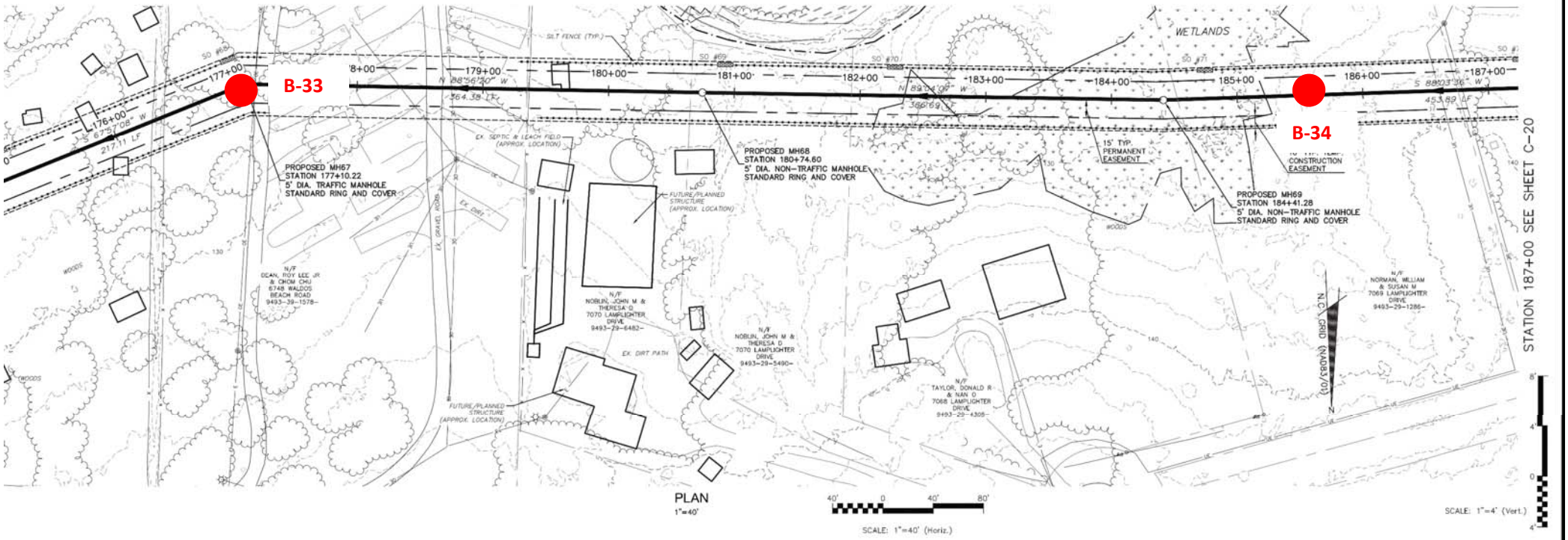
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2T
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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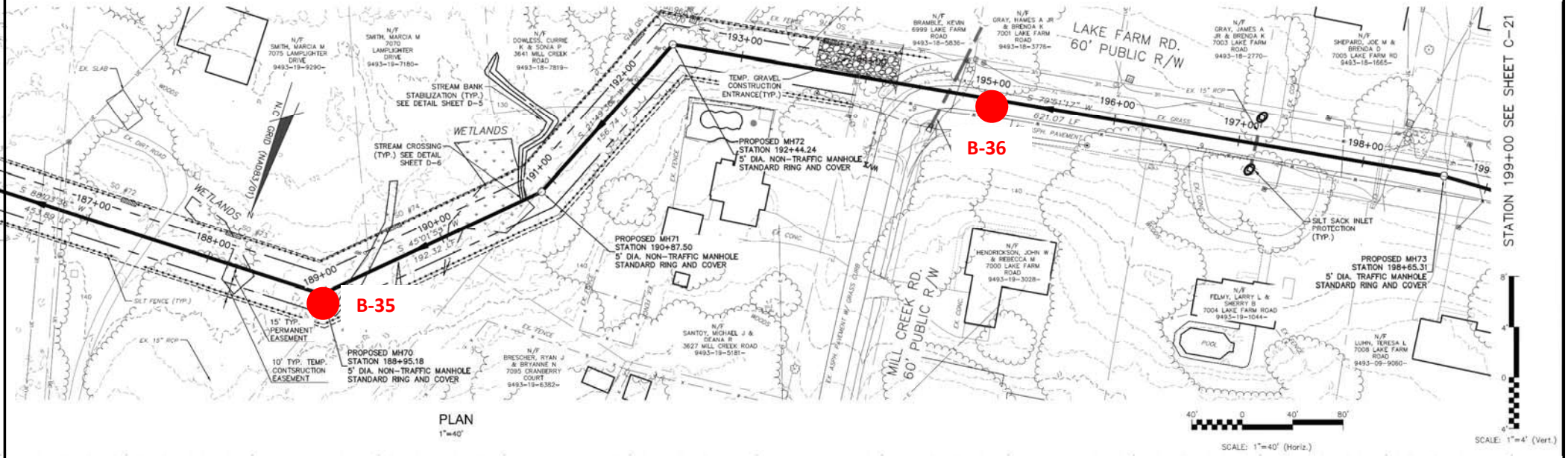
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Hope Mills, North Carolina	
F&R PROJECT No: 66W-0027	
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: August 2019	SCALE: As Shown

FIGURE No.: 2U



Big Rockfish Creek Outfall

● Approximate Boring Location

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2V
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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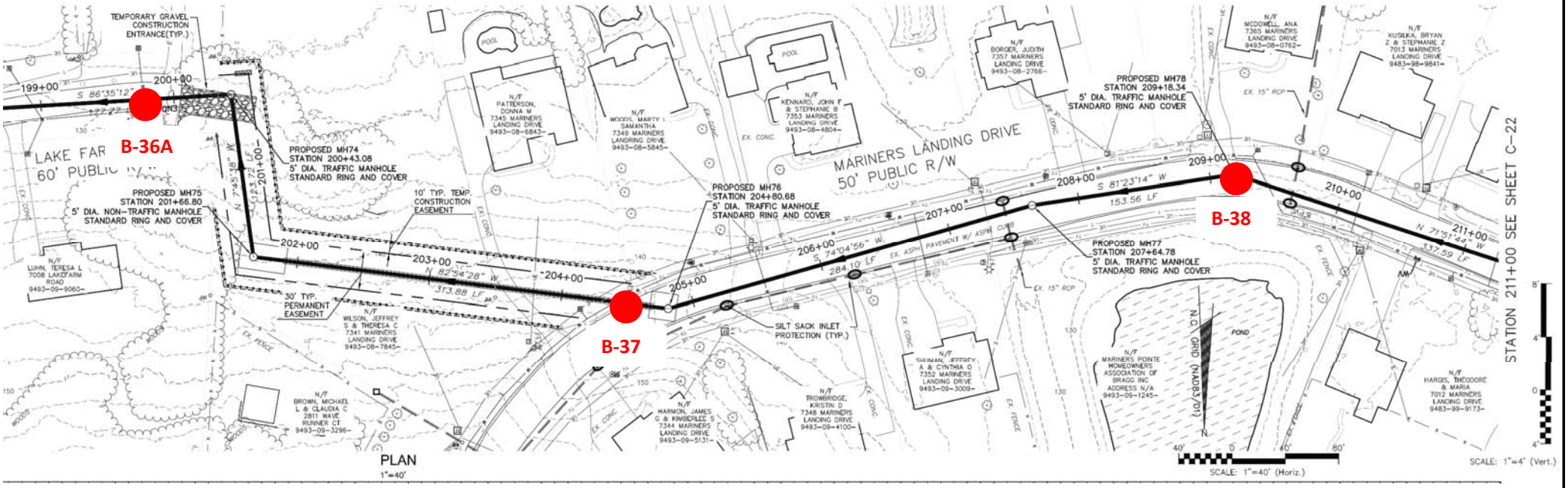
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2W
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

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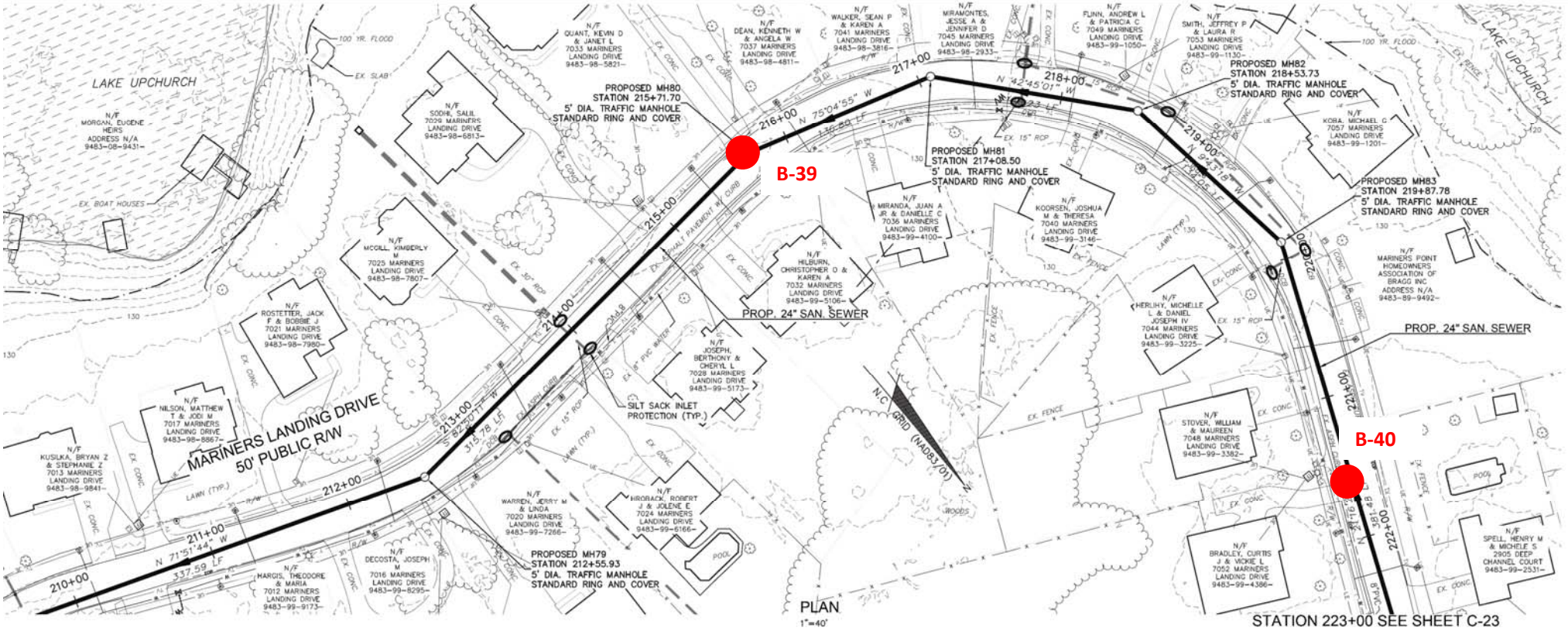
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2X
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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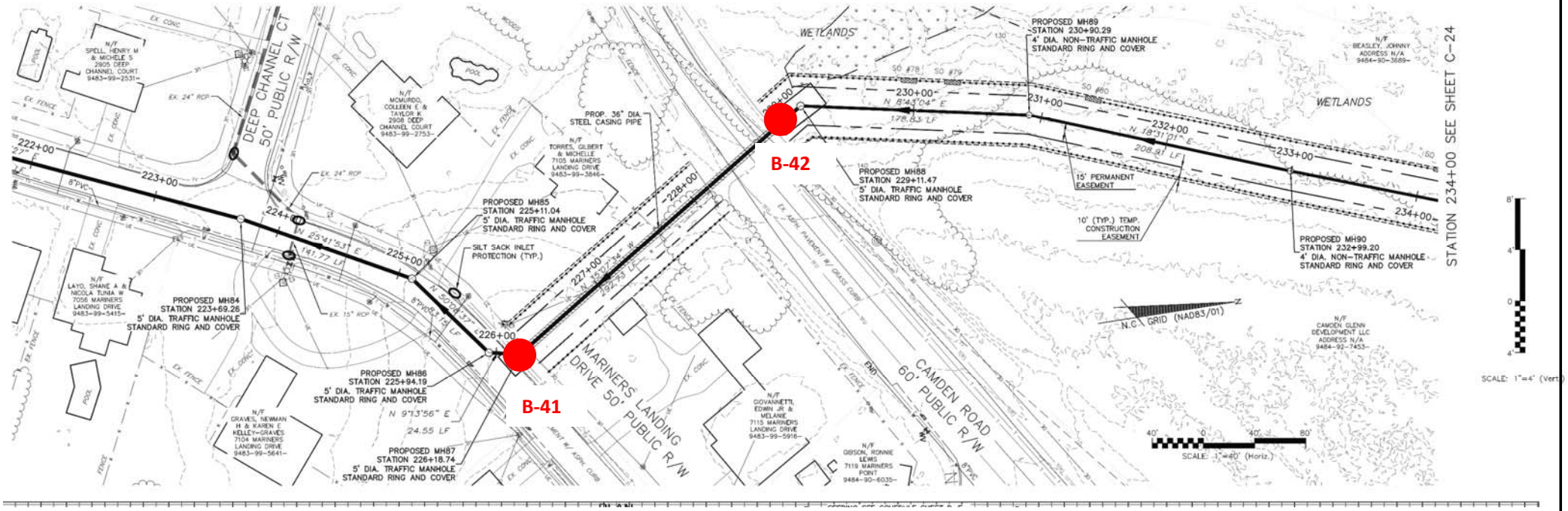
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2Y
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2Z
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

Big Rockfish Creek Outfall

⊕ Approximate Boring Location

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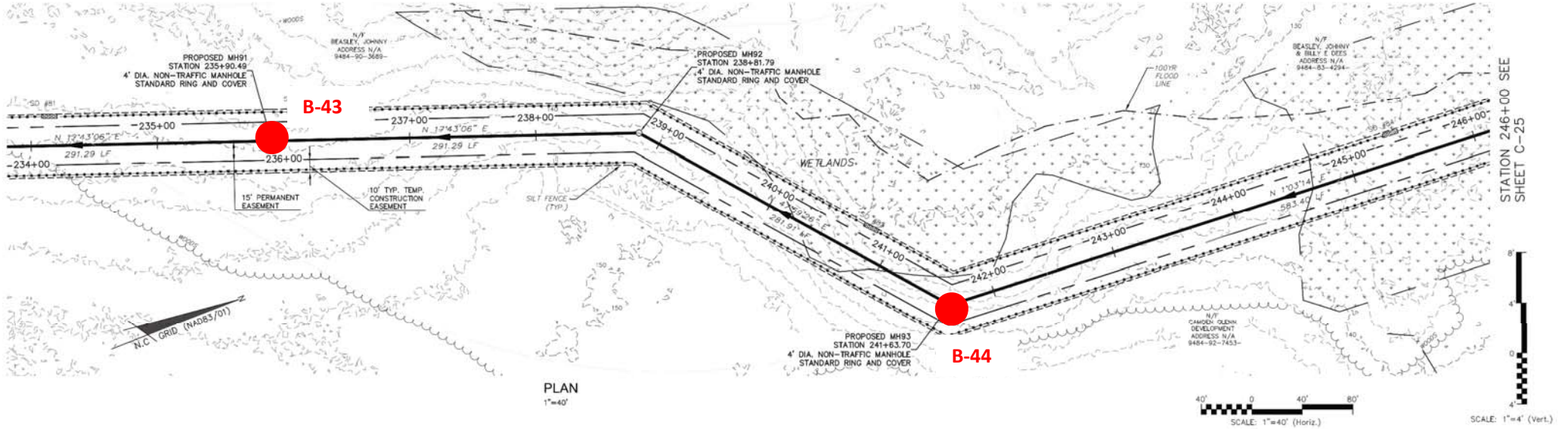
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AA
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



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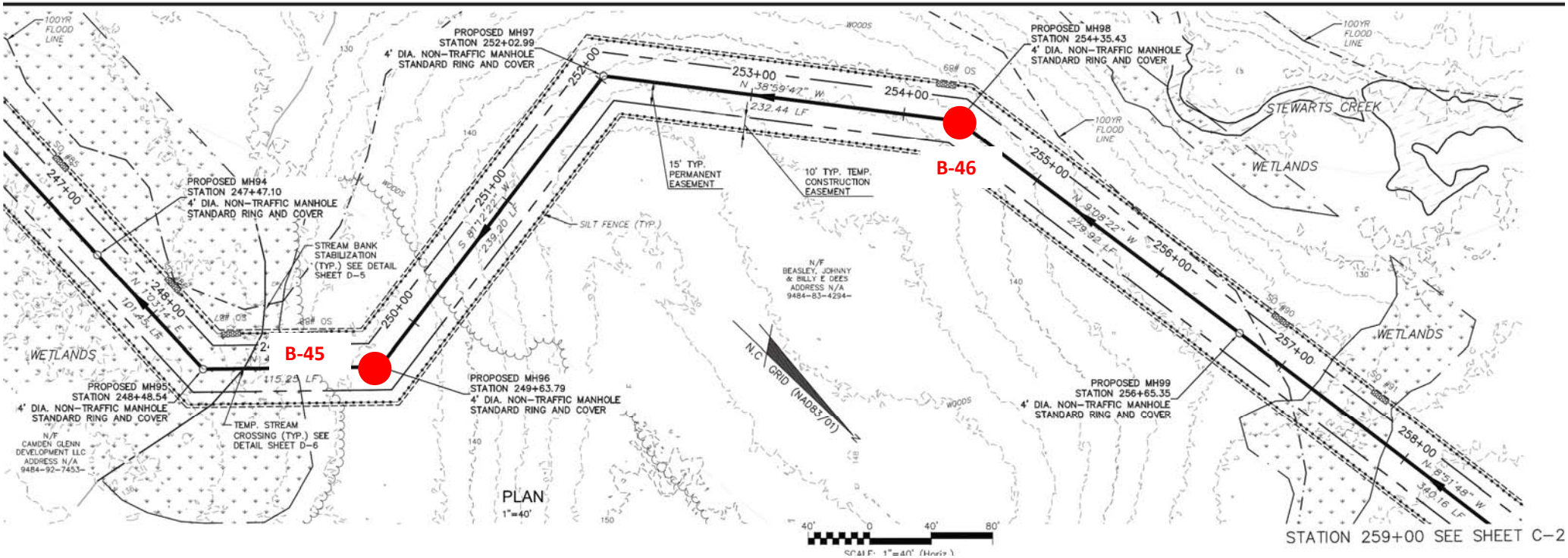
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AB
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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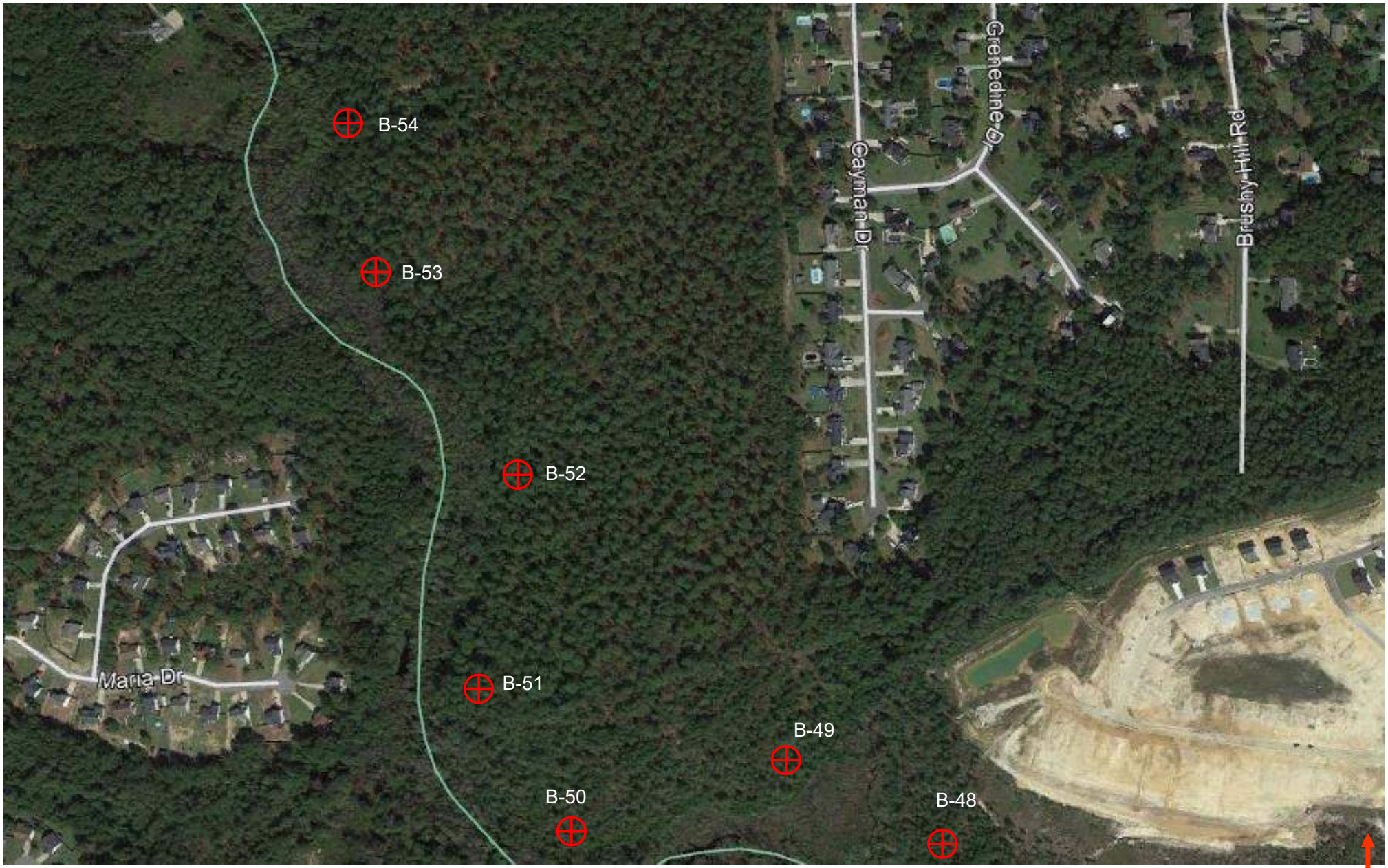
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AC
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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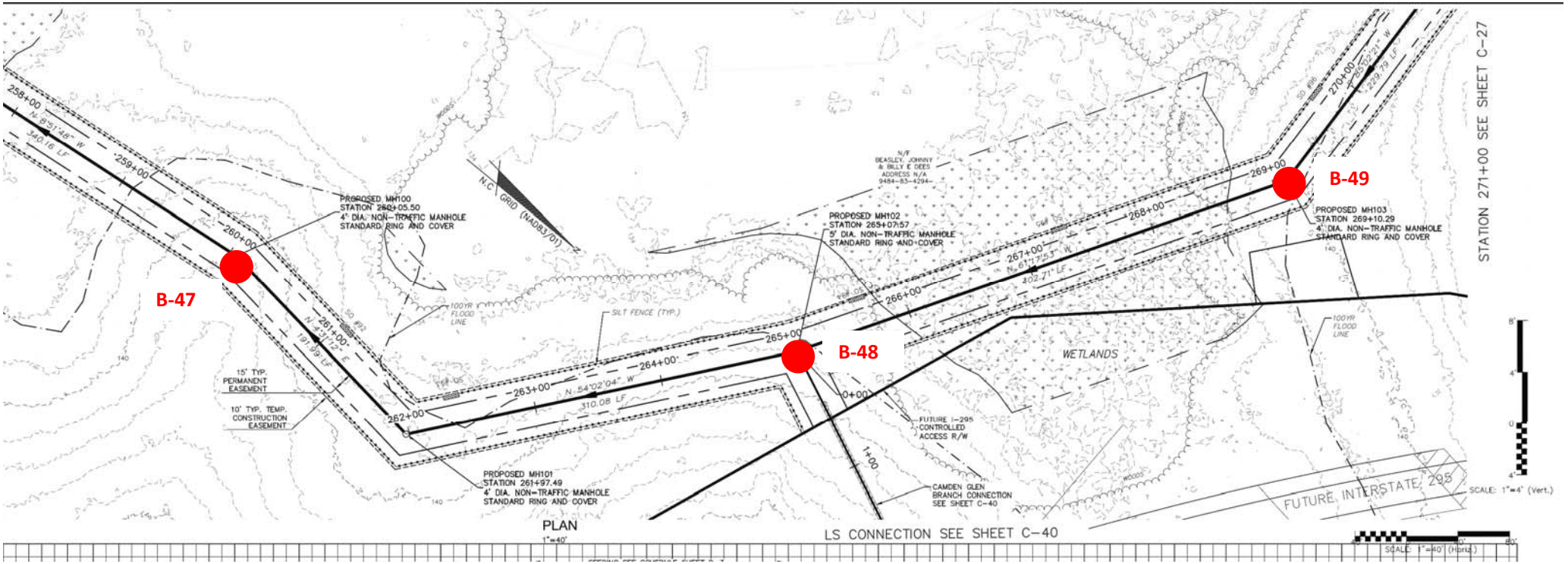
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AD
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

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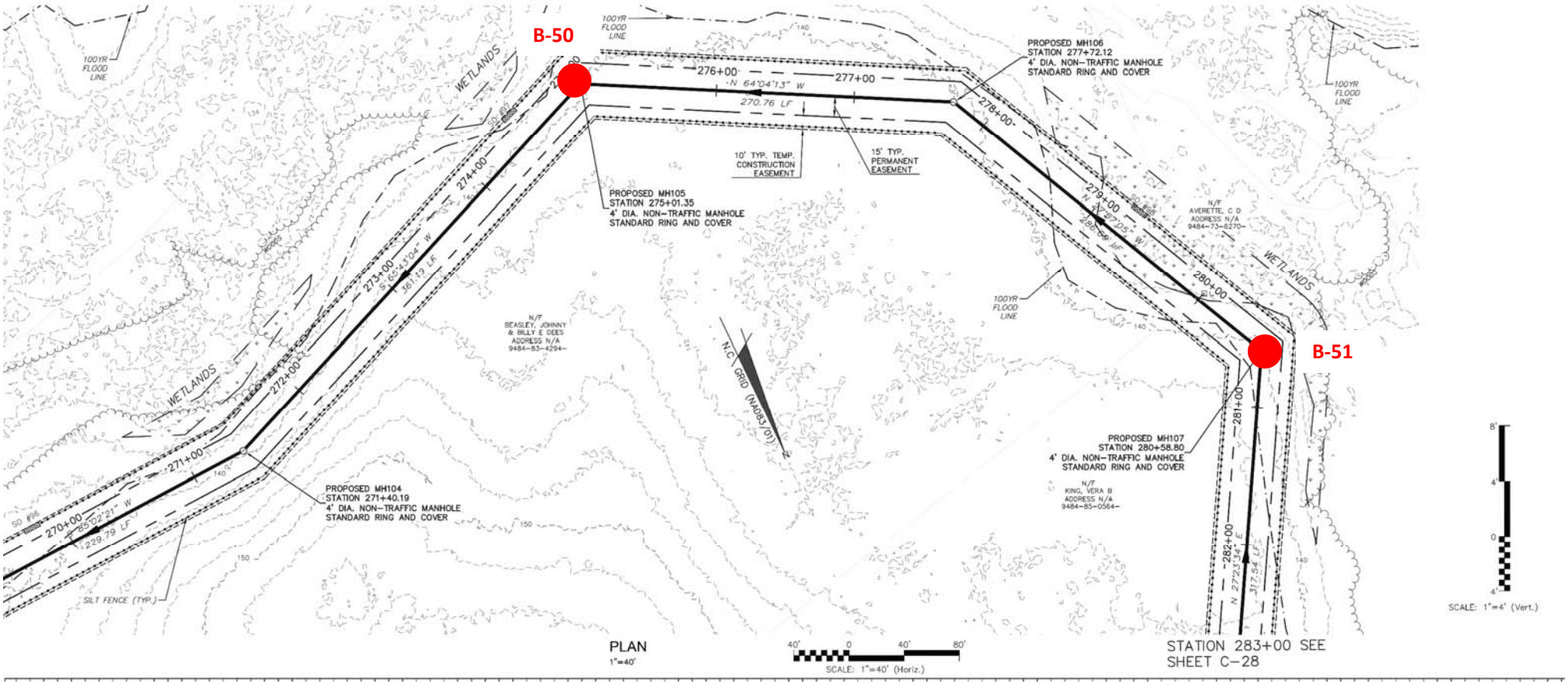
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AE
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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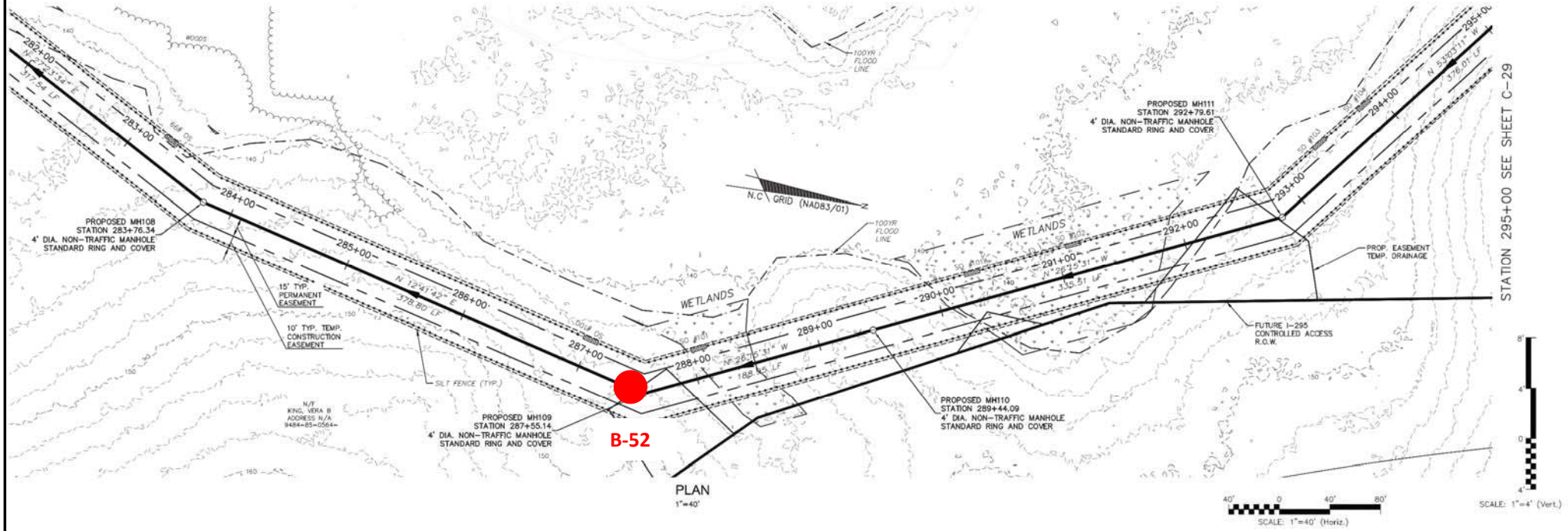
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AF
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AG
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

⊕ Approximate Boring Location

Big Rockfish Creek Outfall

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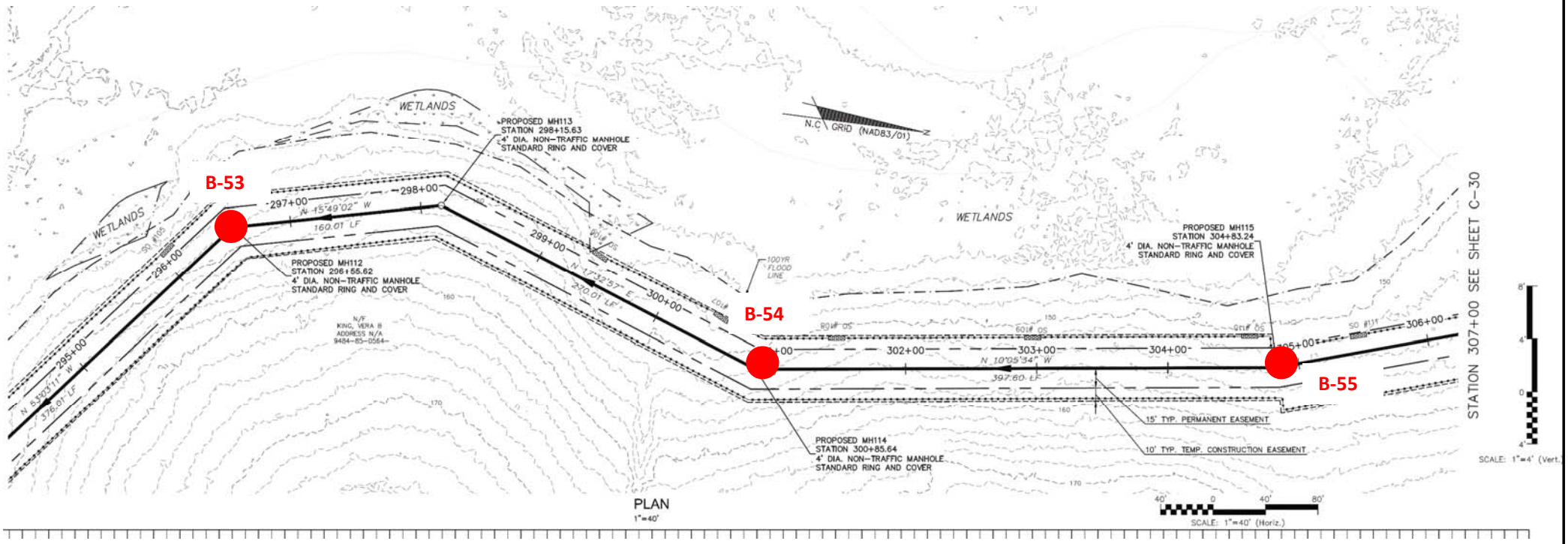
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AH
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	



Big Rockfish Creek Outfall

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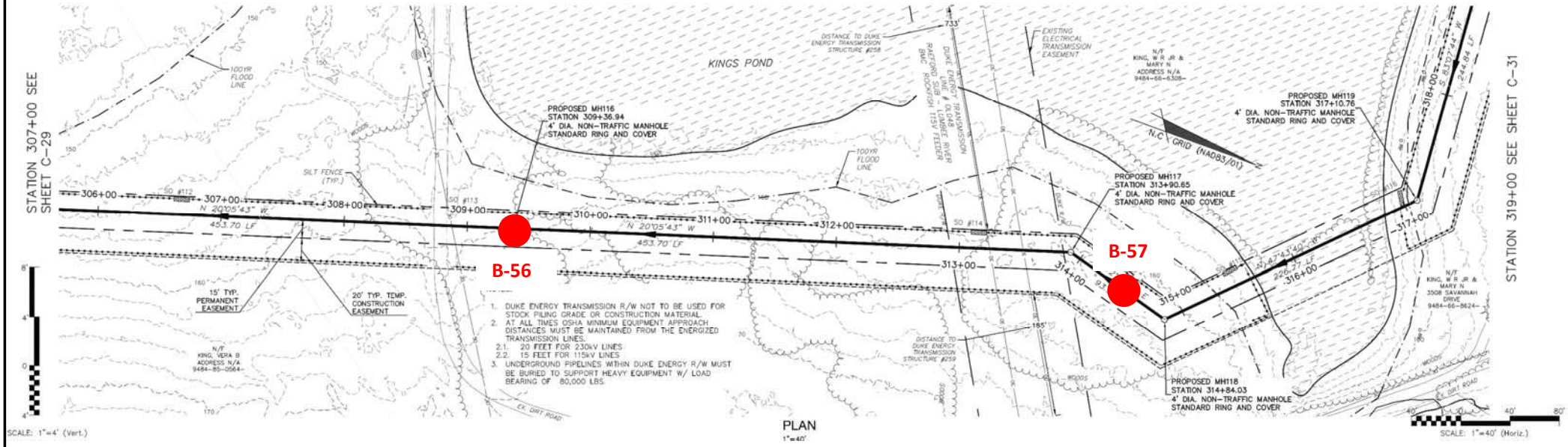
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AI
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

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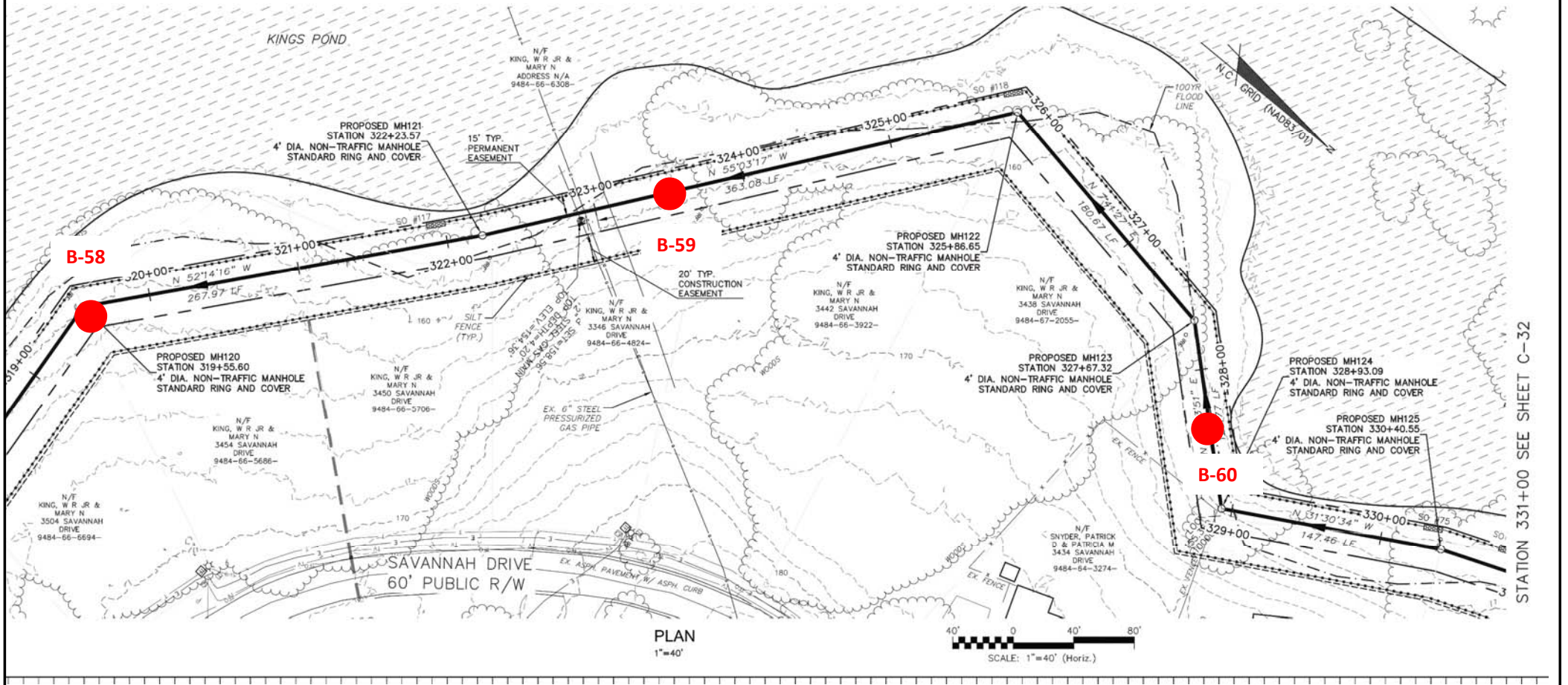
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AJ
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Big Rockfish Creek Outfall

● Approximate Boring Location

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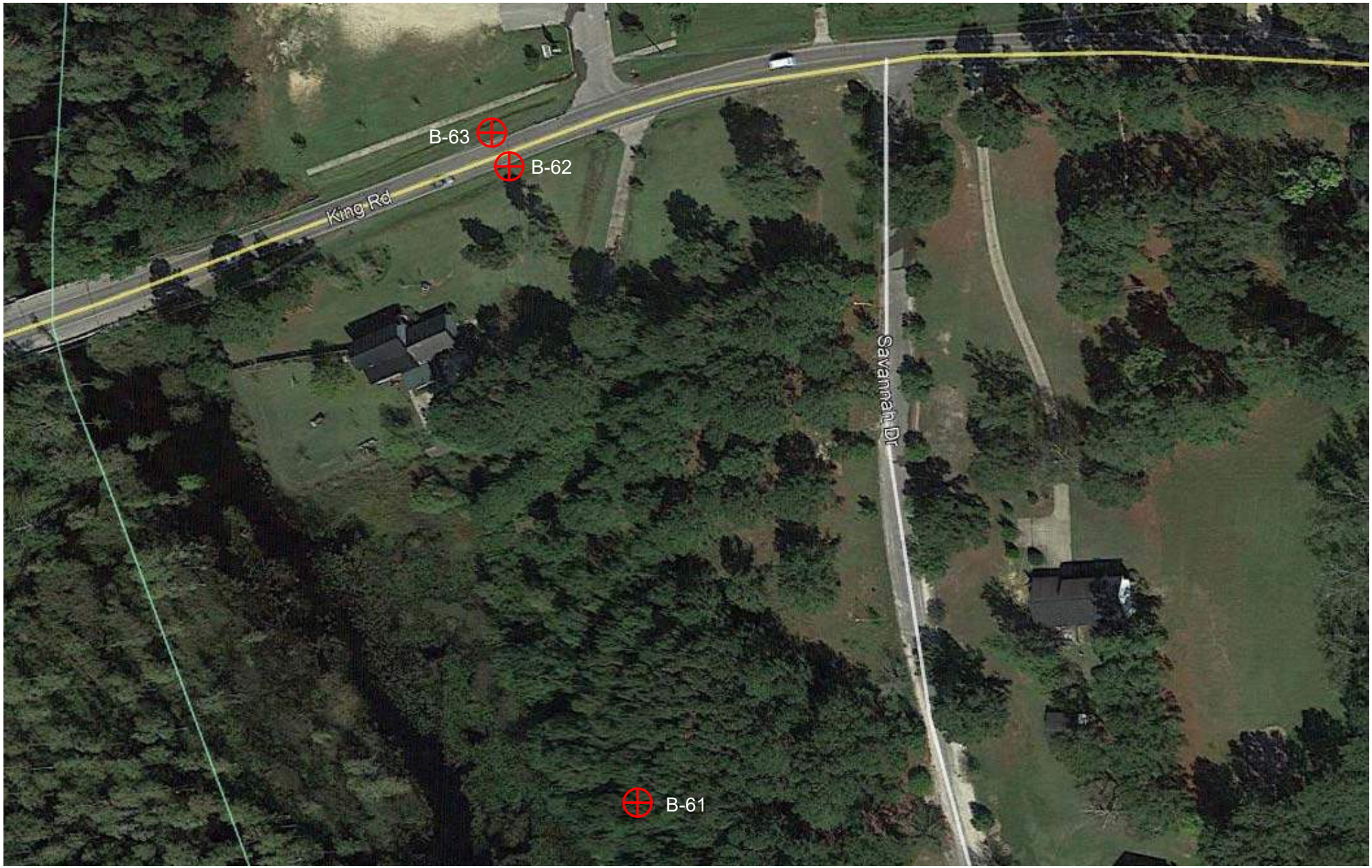
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AK
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



⊕ Approximate Boring Location

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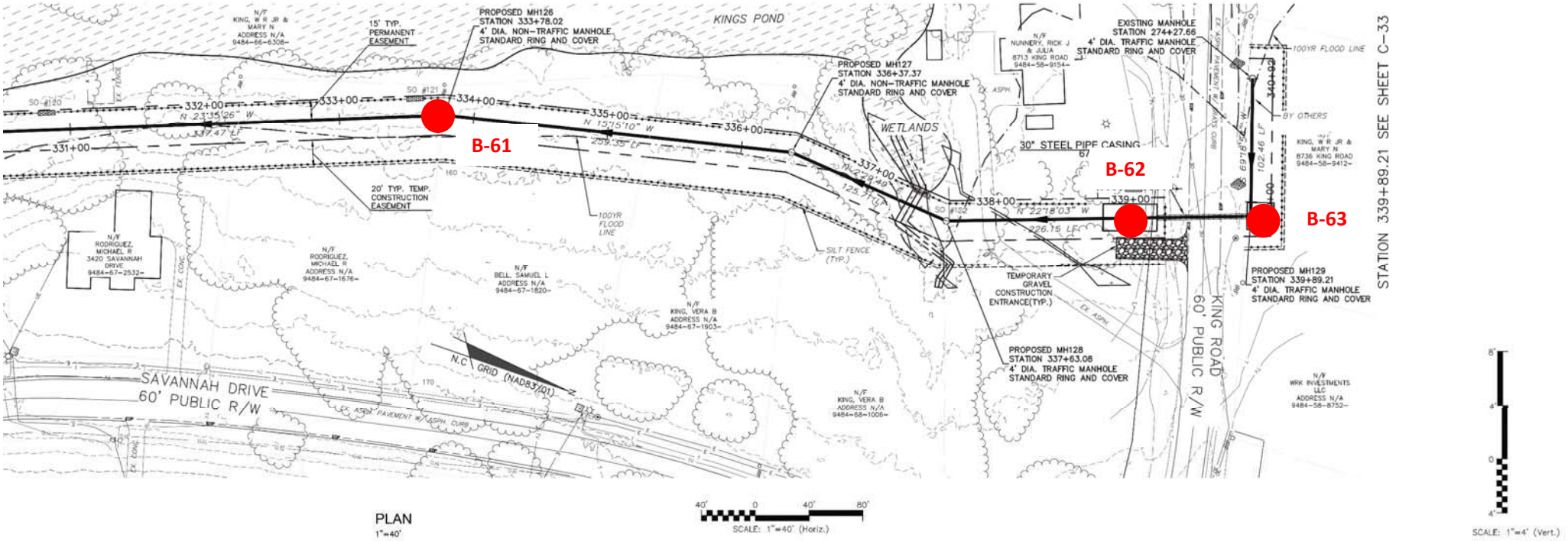
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Fayetteville, North Carolina	
F&R PROJECT No: 66W-0027	FIGURE No.: 2AL
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: January 2019	SCALE: Not to scale



Big Rockfish Creek Outfall

● Approximate Boring Location

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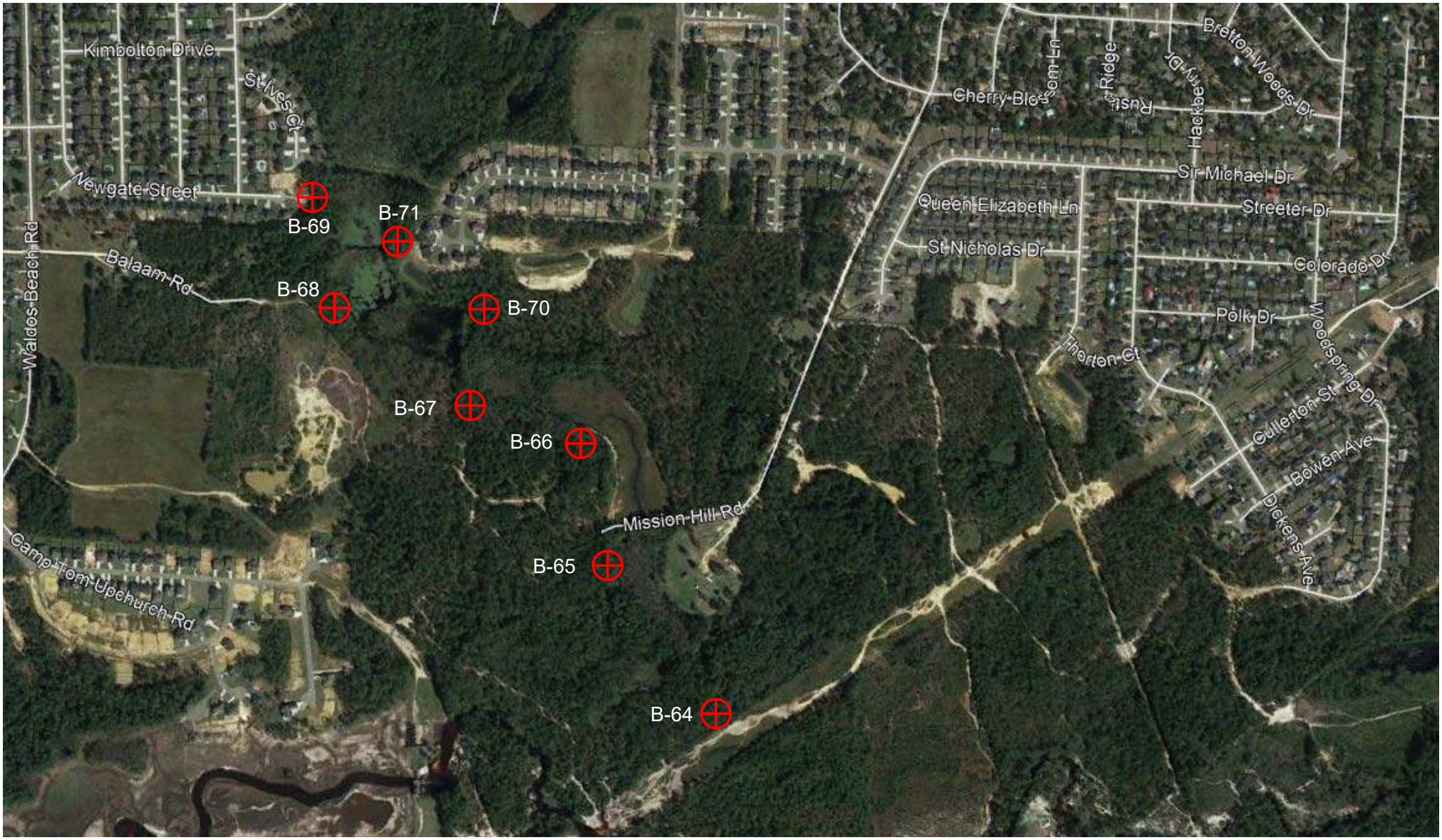
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AM
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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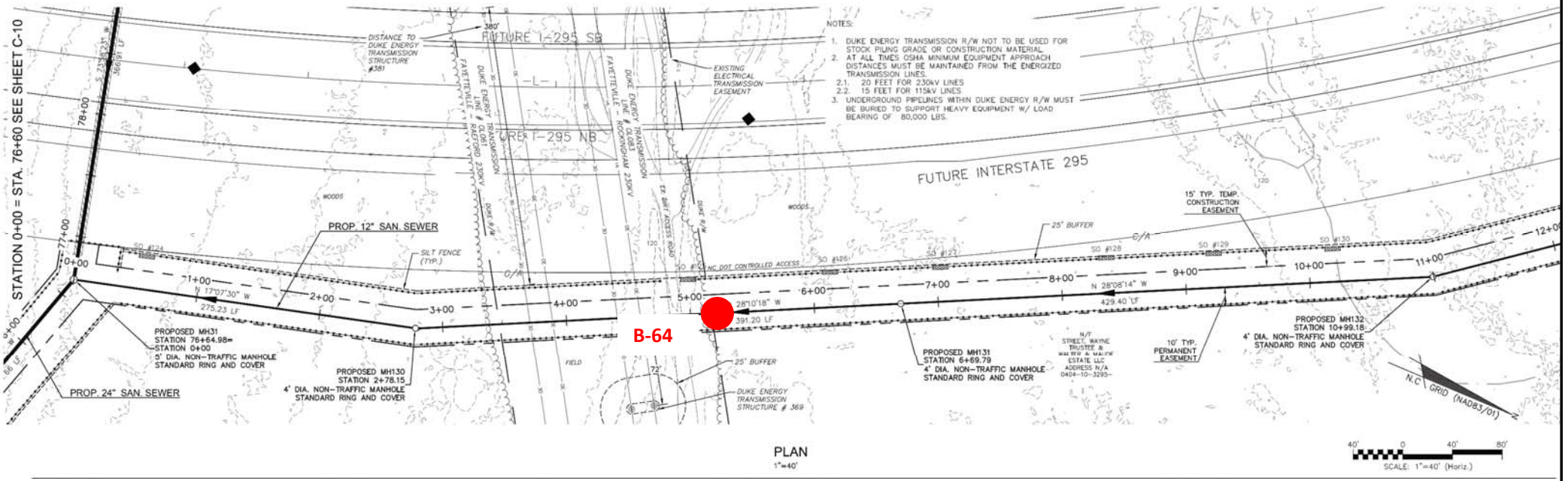
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Fayetteville, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AN
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: January 2019	SCALE: Not to scale	



Camden Woods LS Connections

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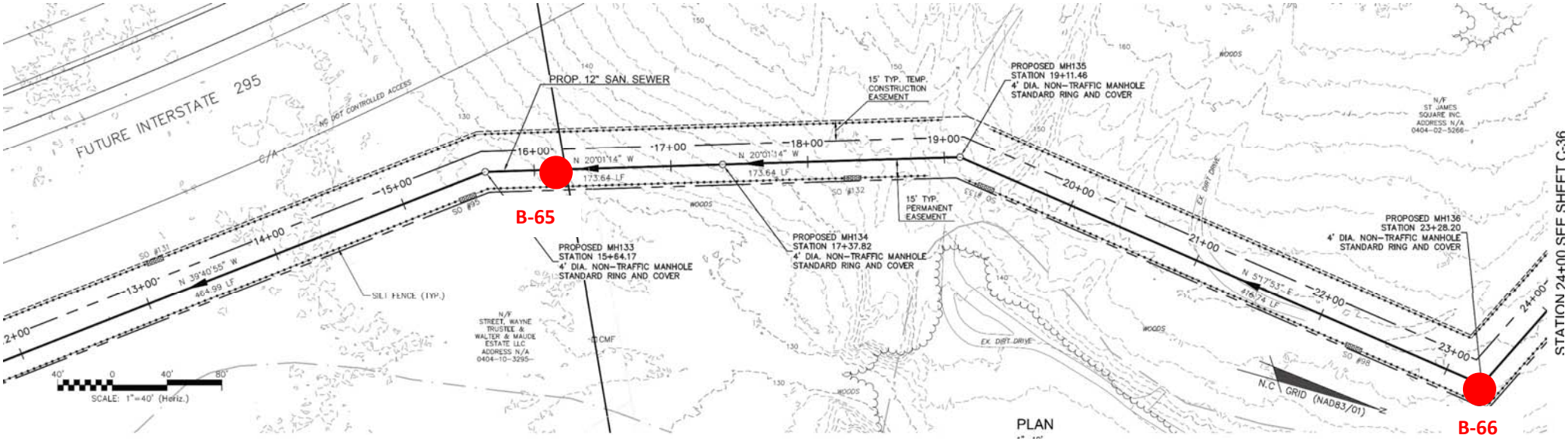
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AO
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Camden Woods LS Connections

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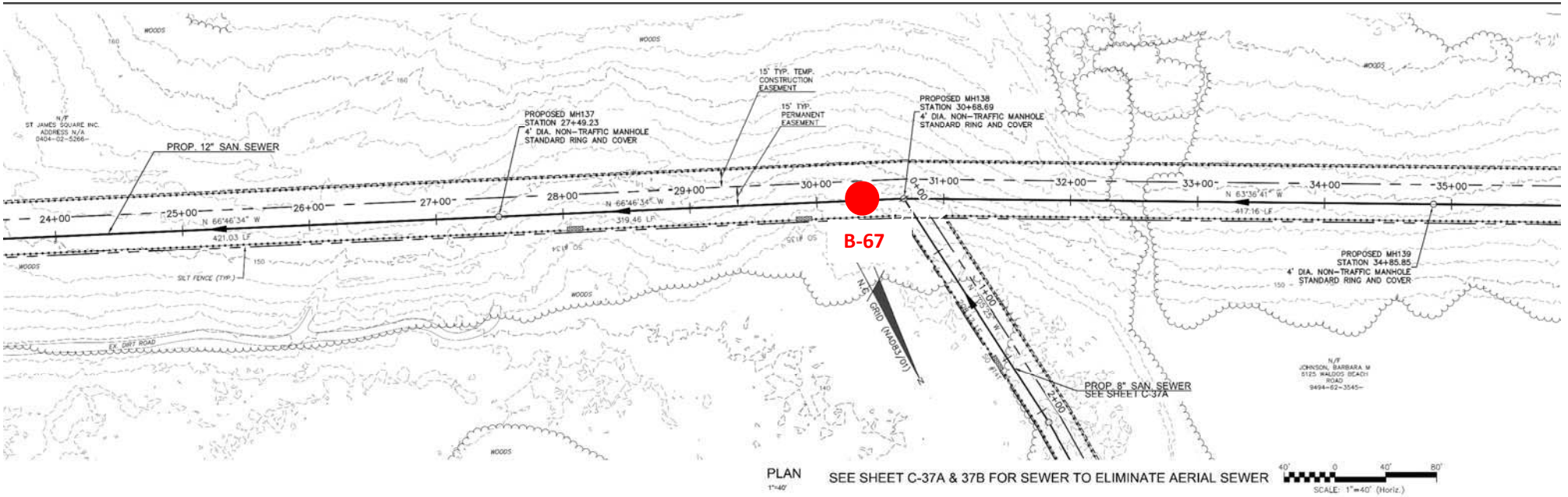
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AP
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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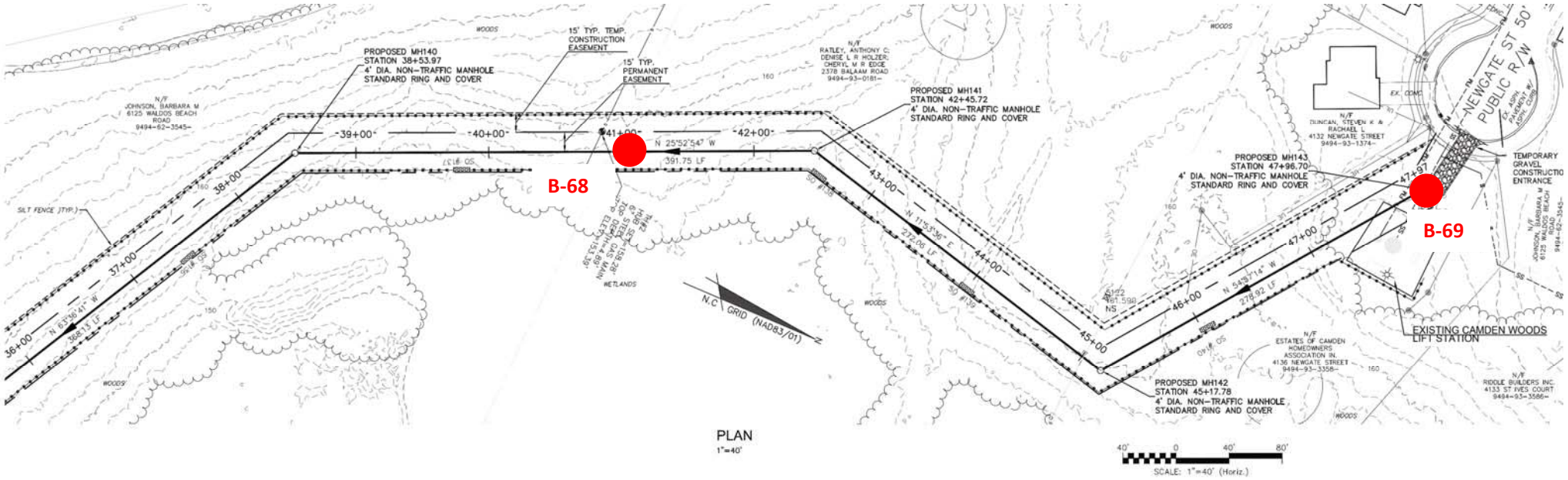
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AQ
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



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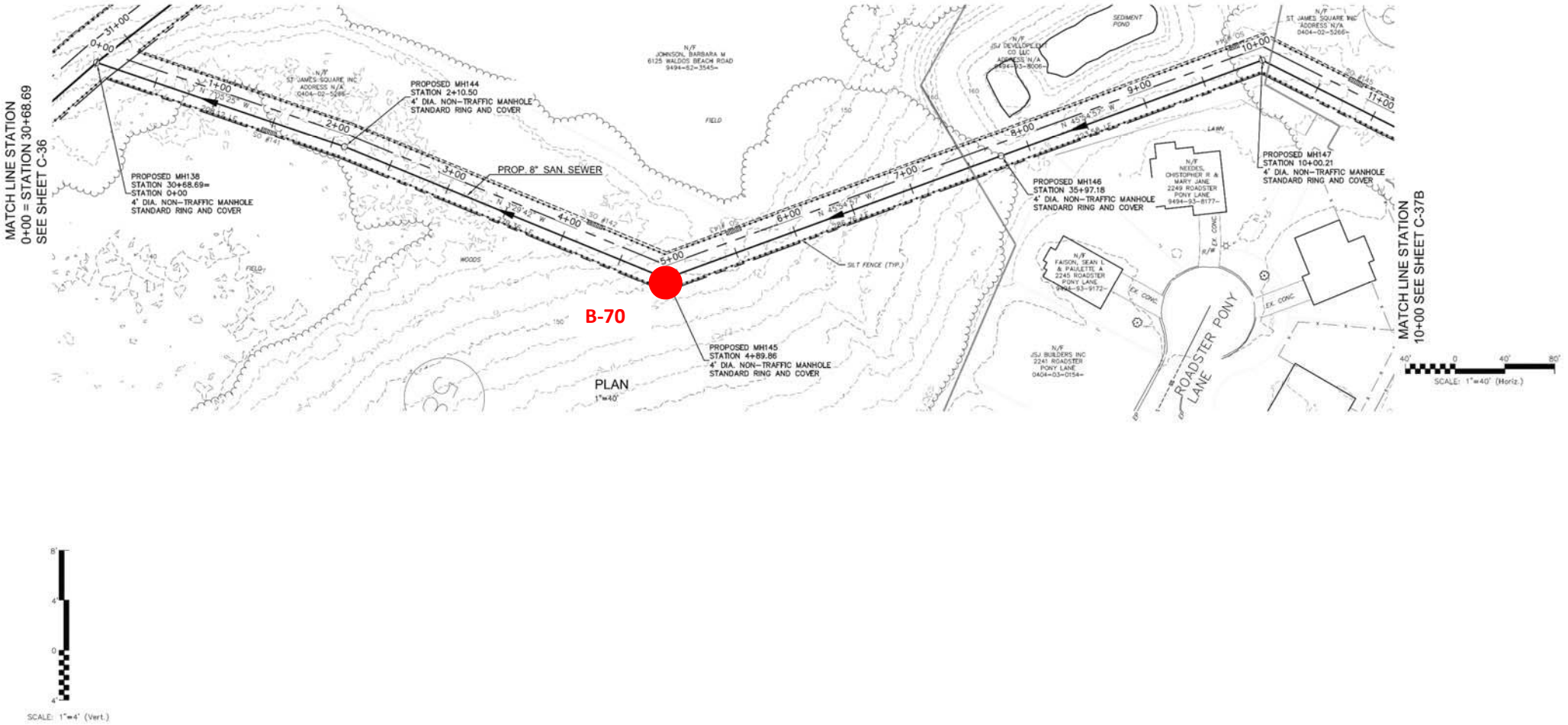
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AR
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Camden Woods LS Connections

● Approximate Boring Location

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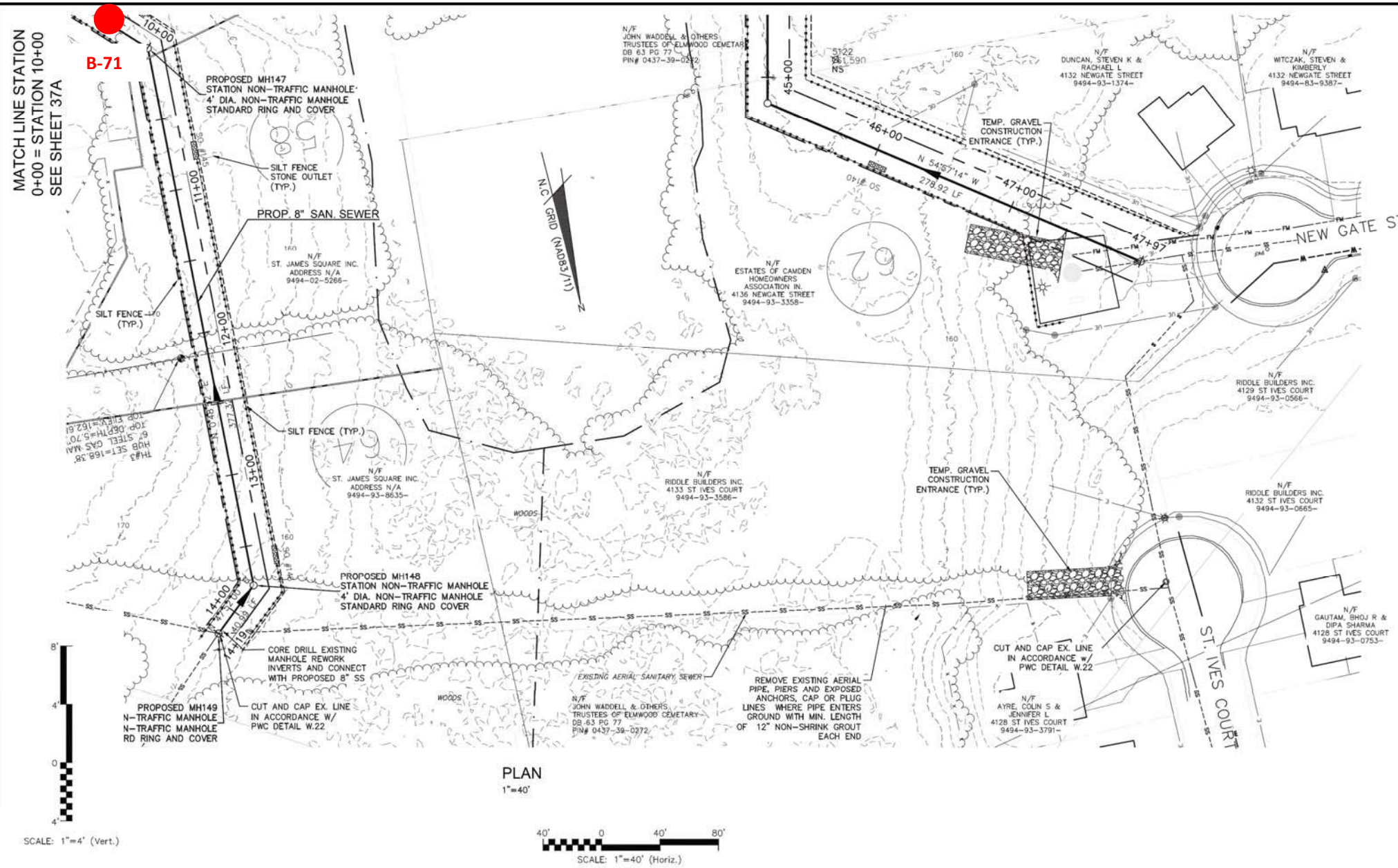
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AS
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



Camden Woods LS Connections

● Approximate Boring Location

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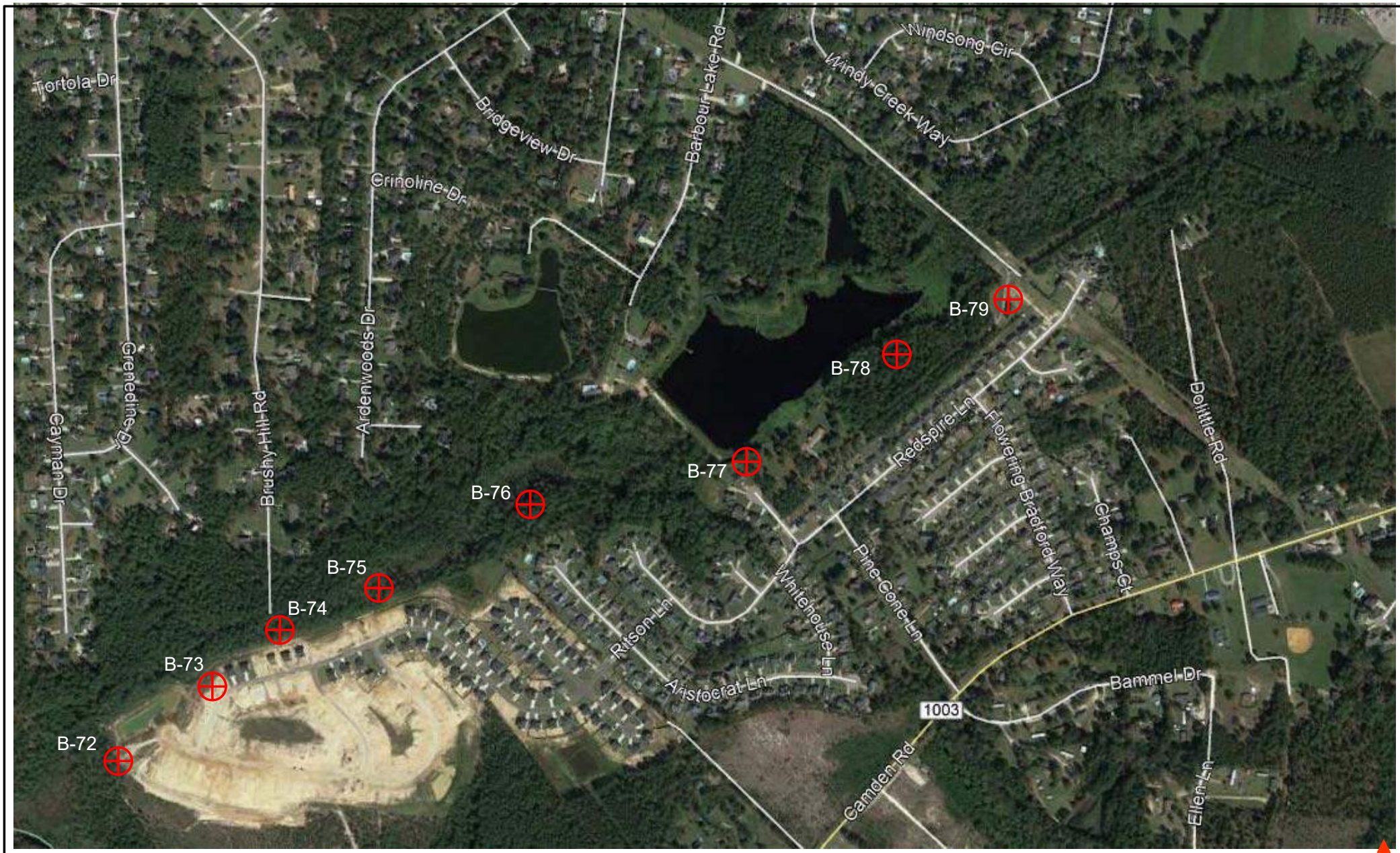
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AT
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



⊕ Approximate Boring Location

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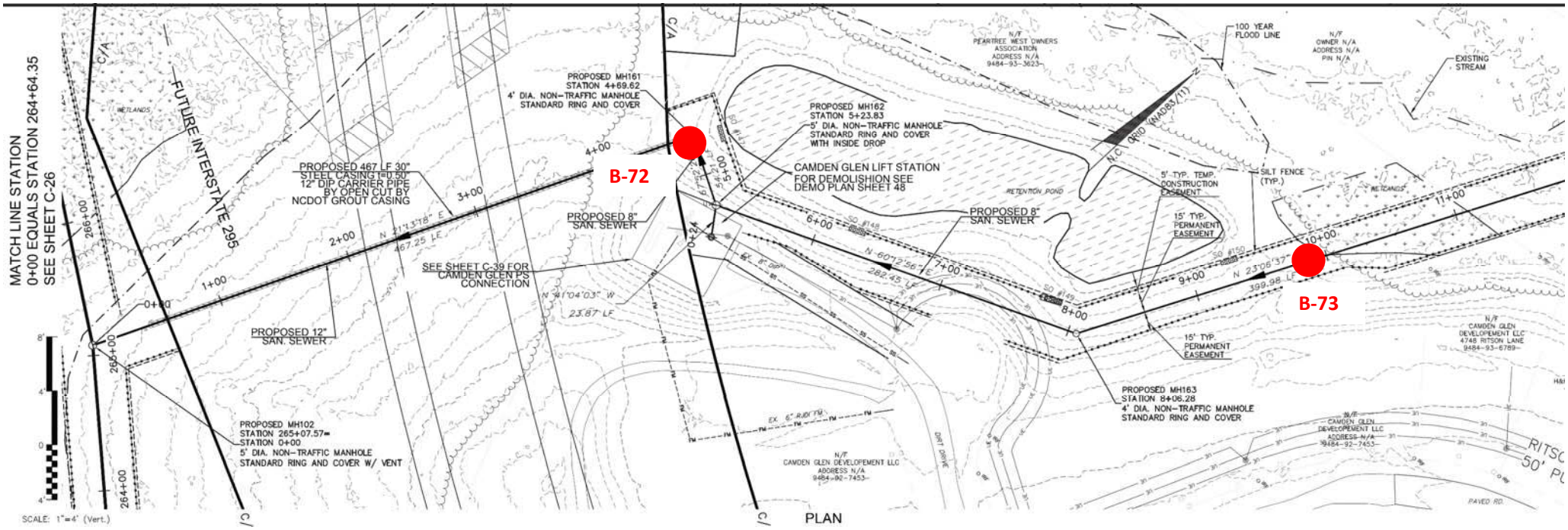
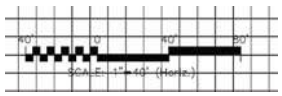
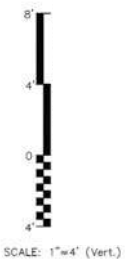
BORING LOCATION PLAN

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall	
LOCATION: Fayetteville, North Carolina	
F&R PROJECT No: 66W-0027	FIGURE No.: 2AU
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.
DATE: January 2019	SCALE: Not to scale







● Approximate Boring Location

Peartree Estates LS Connection

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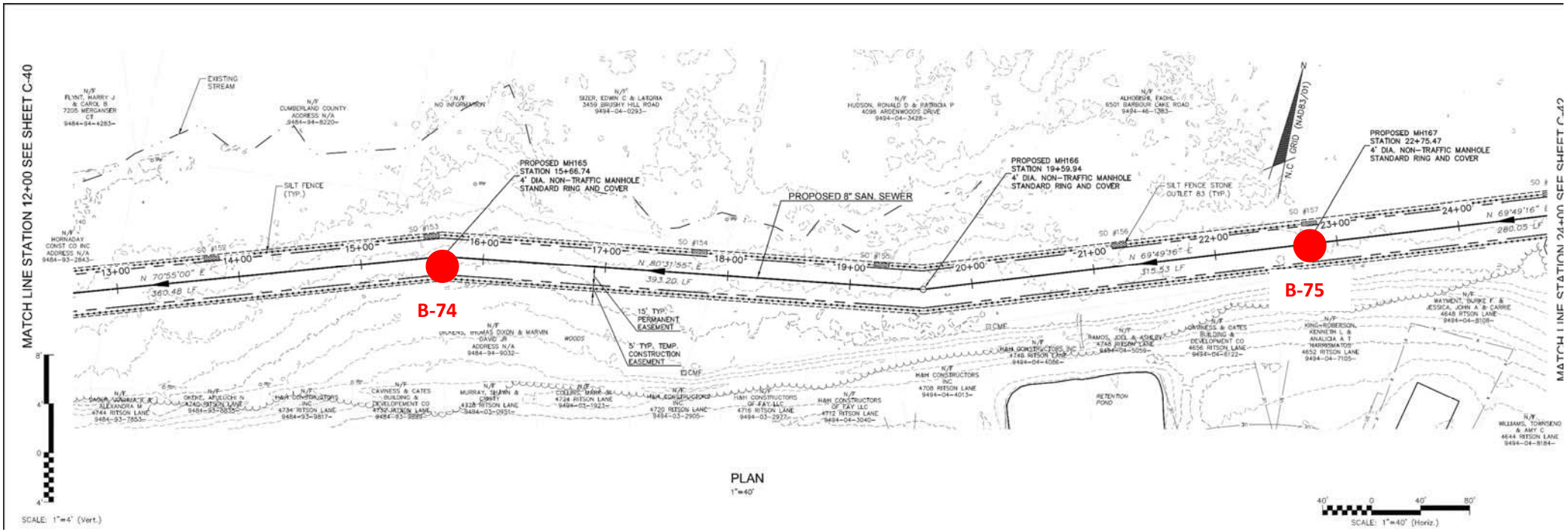
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AV
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



● Approximate Boring Location

Peartree Estates LS Connection

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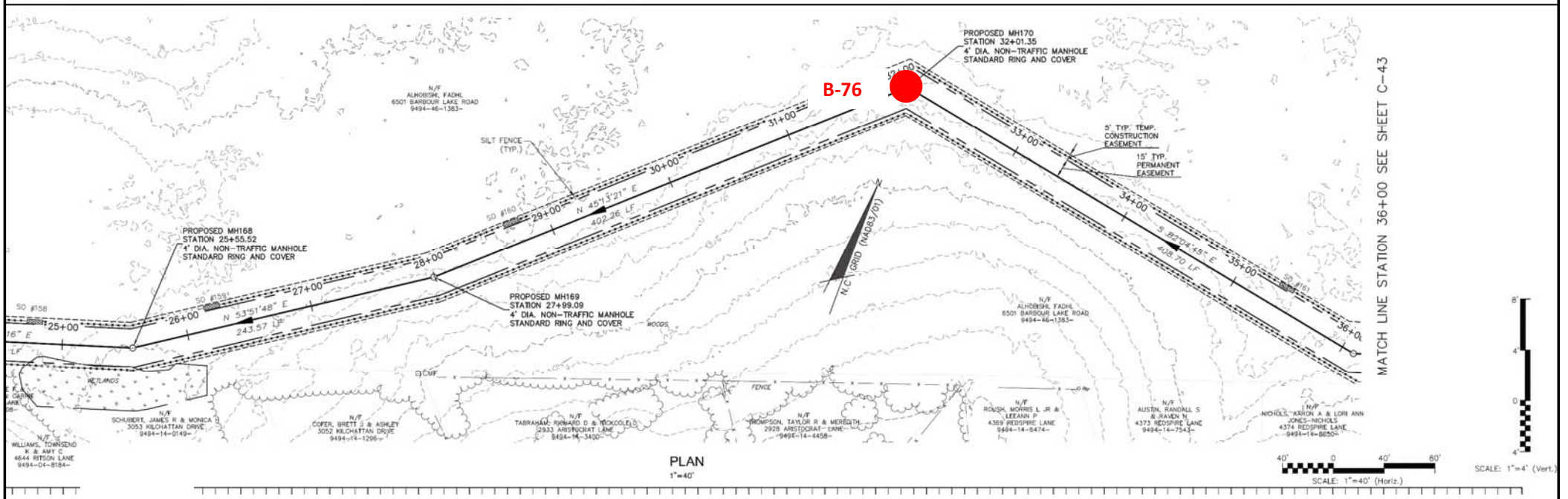
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AW
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



● Approximate Boring Location

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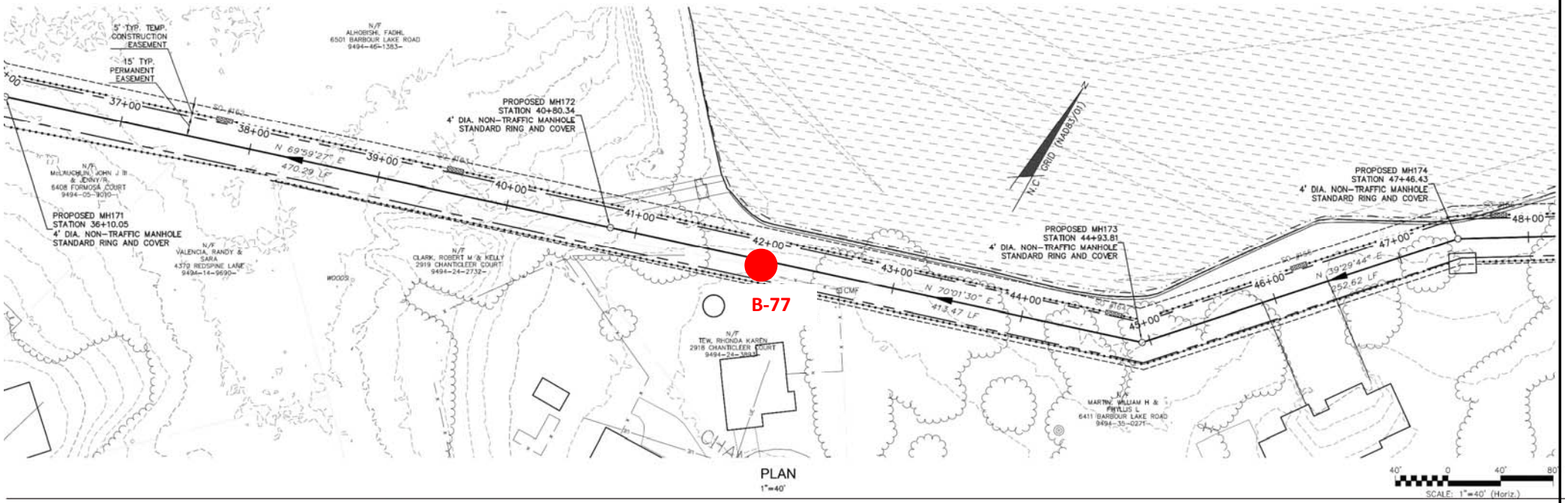
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AX
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



● Approximate Boring Location

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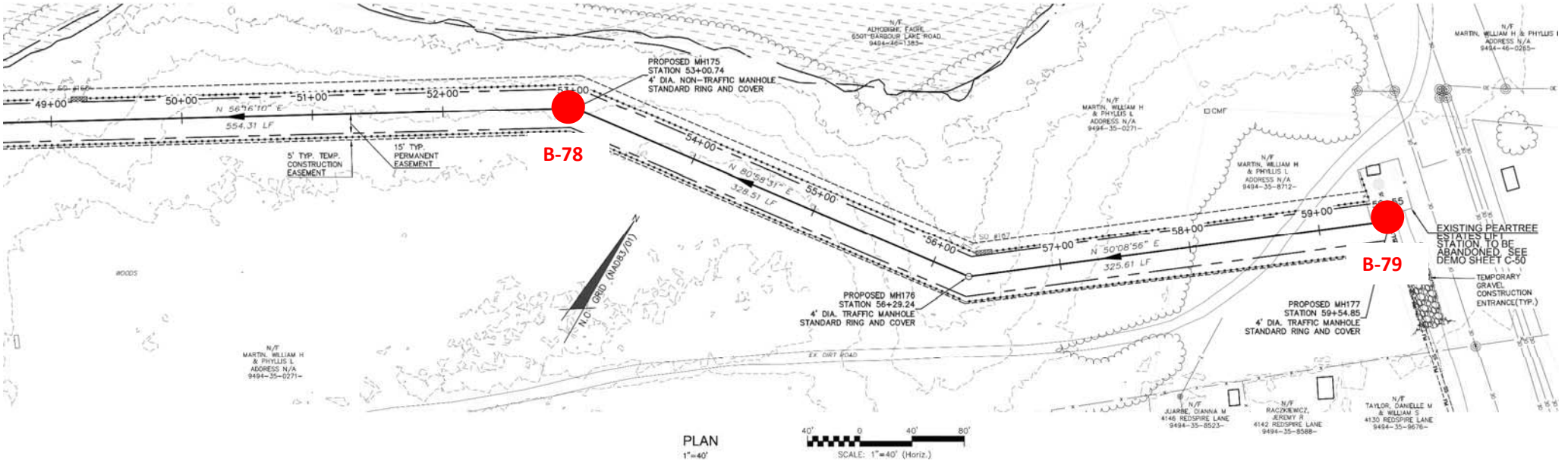
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AY
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



● Approximate Boring Location

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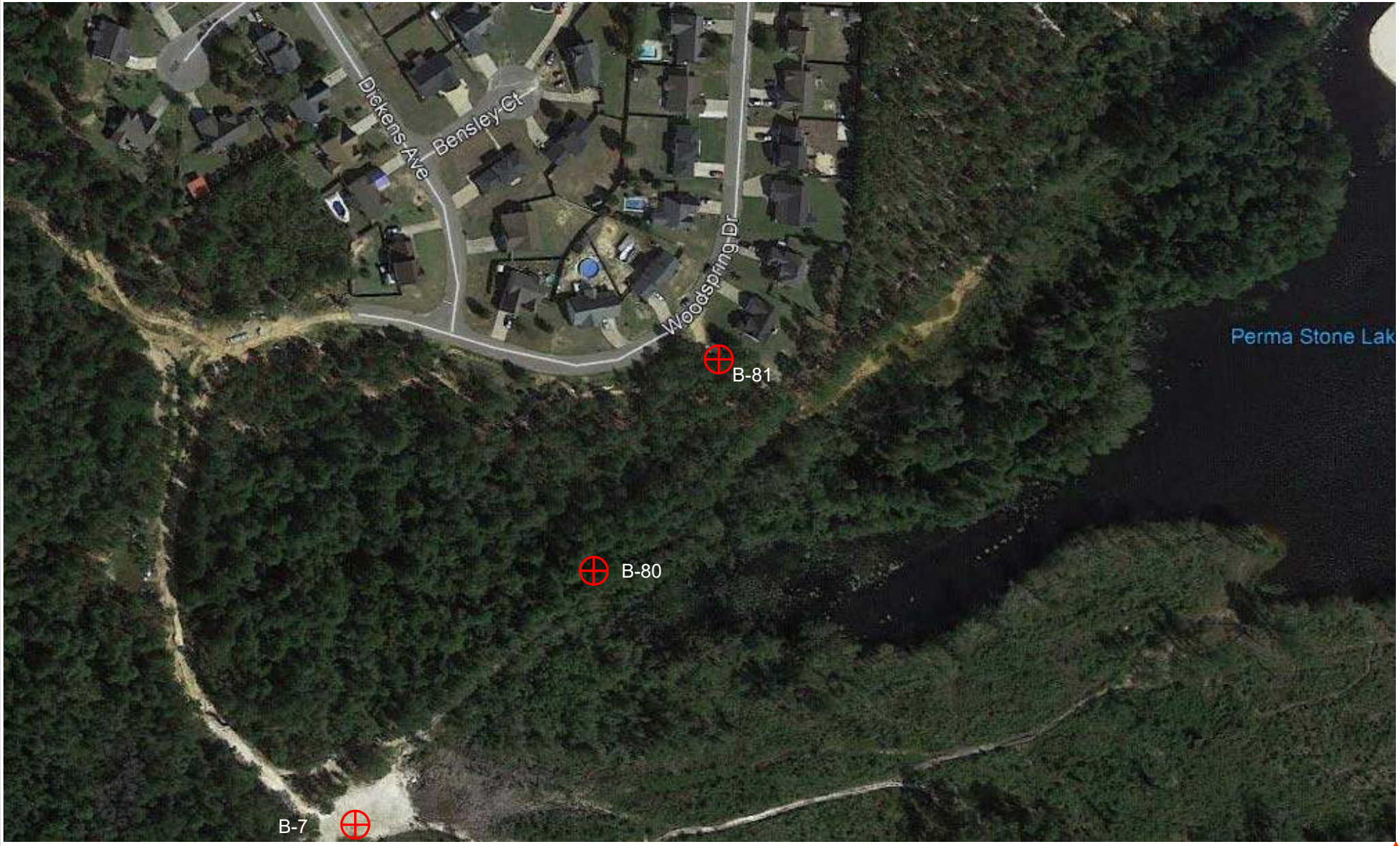
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AZ
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	



⊕ Approximate Boring Location

South Hampton LS Connection

N

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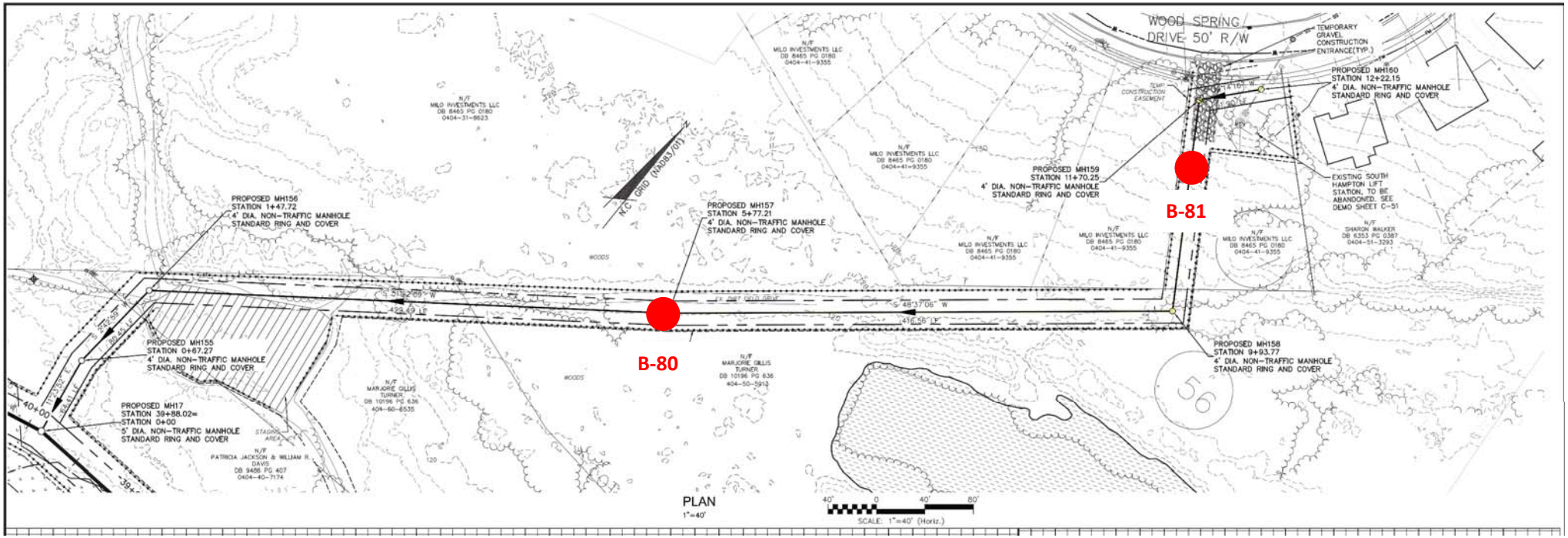
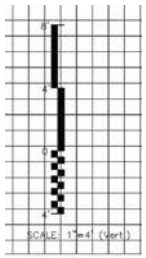
BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AAA
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: Not to scale	





● Approximate Boring Location

South Hampton LS Connection

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BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall		
LOCATION: Hope Mills, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2AAB
DRAWN BY: M. Kayser	CHECKED BY: M. Sabodish, P.E.	
DATE: August 2019	SCALE: As Shown	

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 3

Project No: 66W-0027

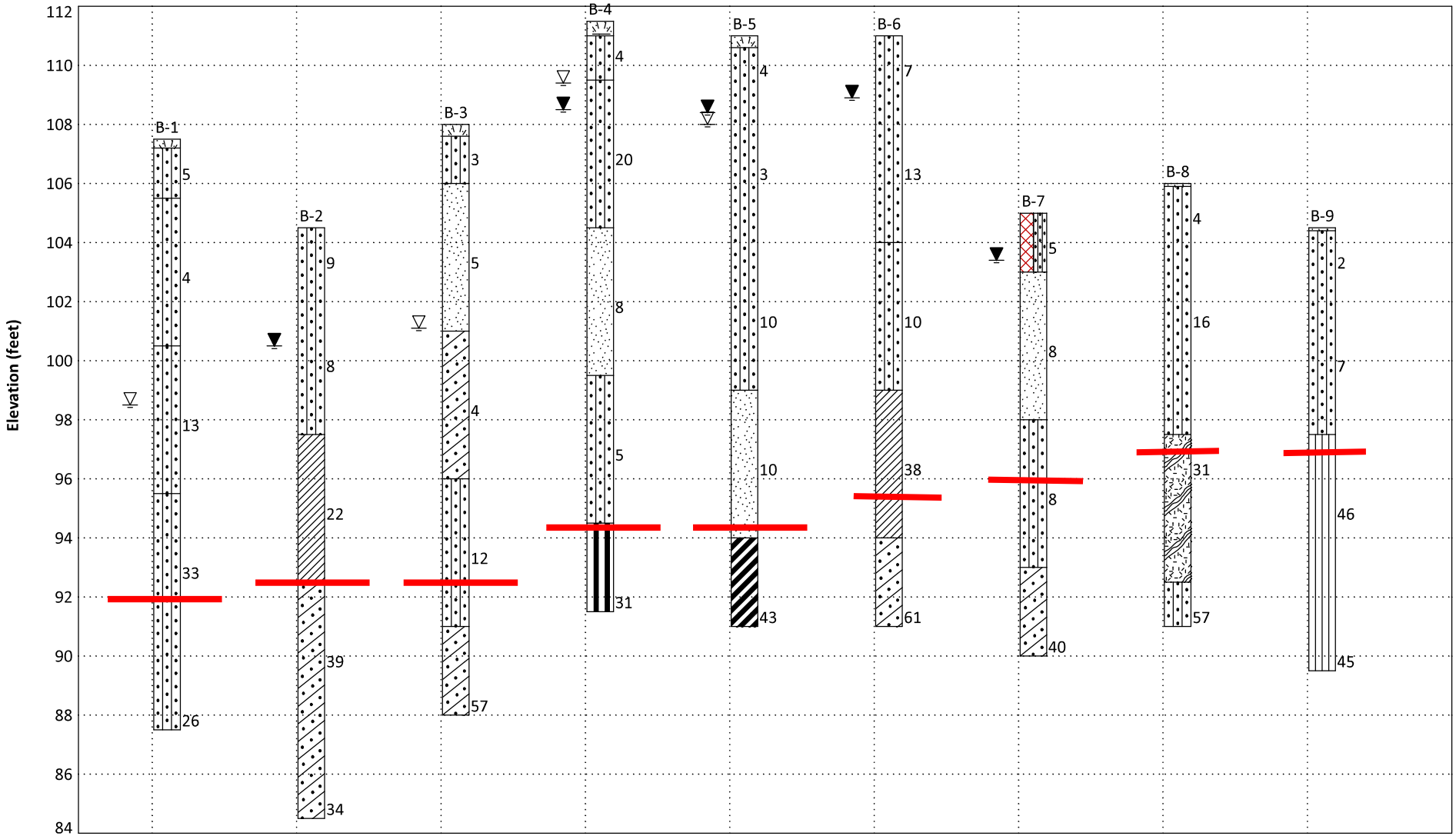
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 7/30/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 4

Project No: 66W-0027

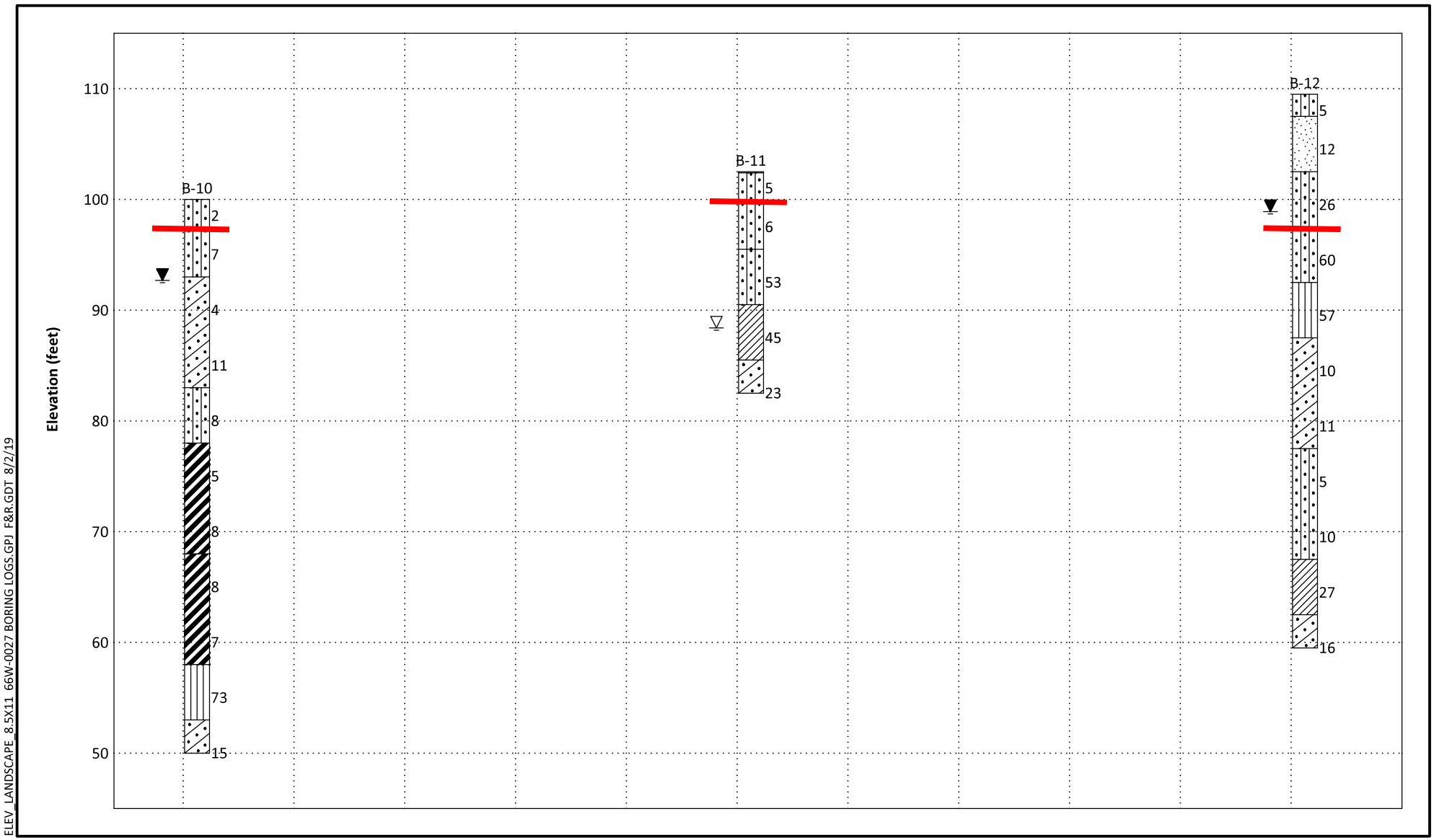
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 5

Project No: 66W-0027

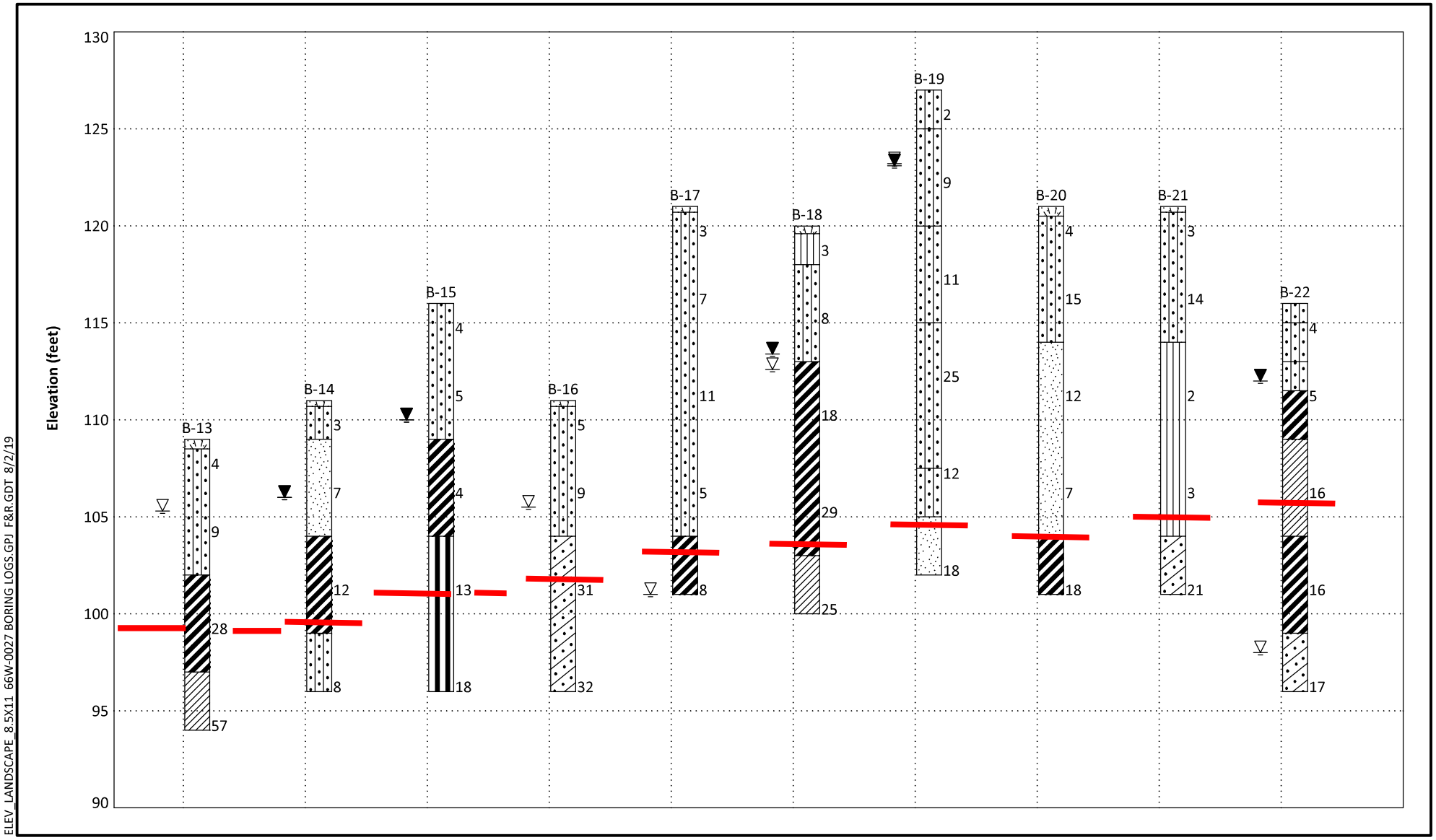
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 6

Project No: 66W-0027

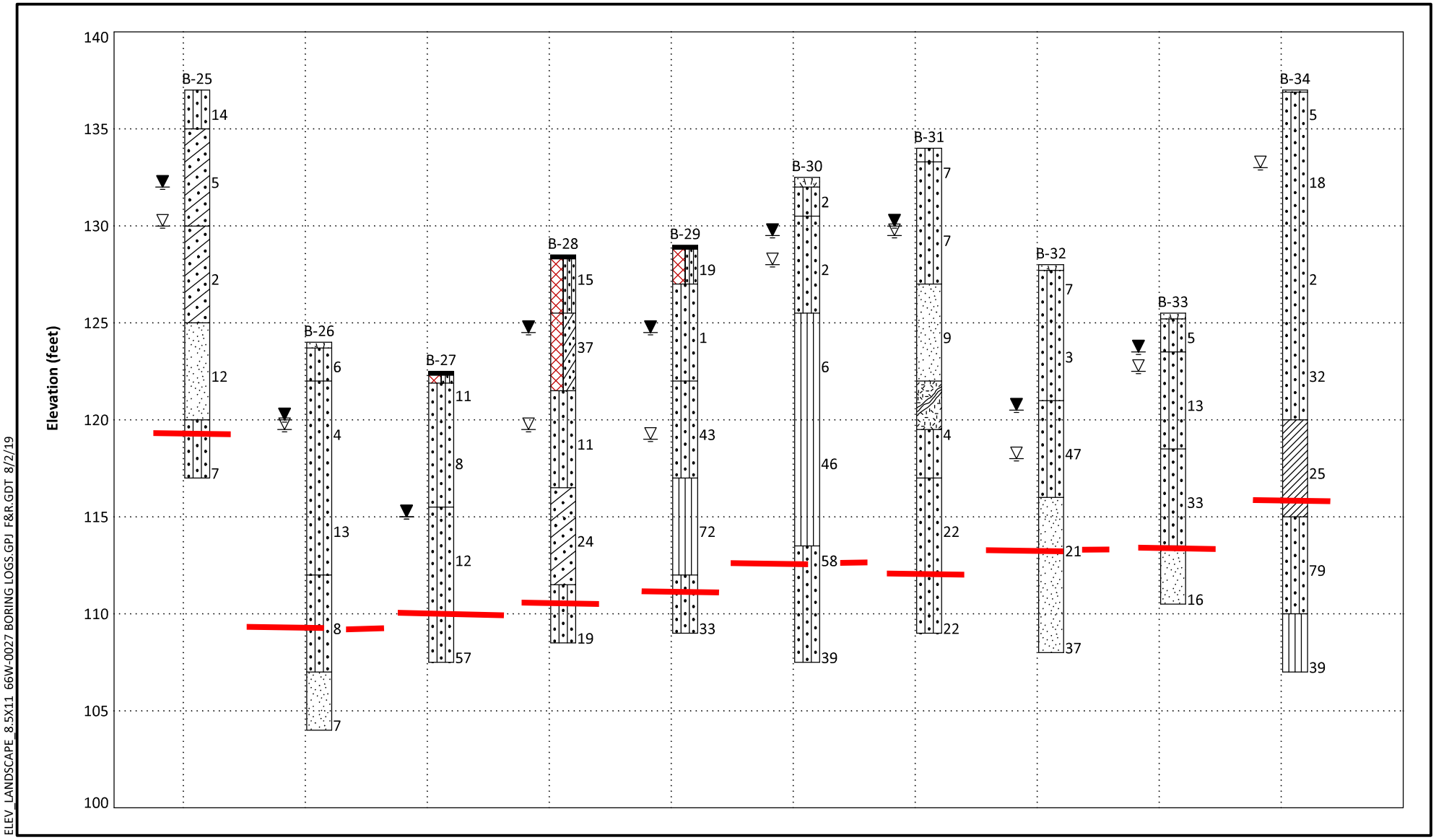
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11 66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 7

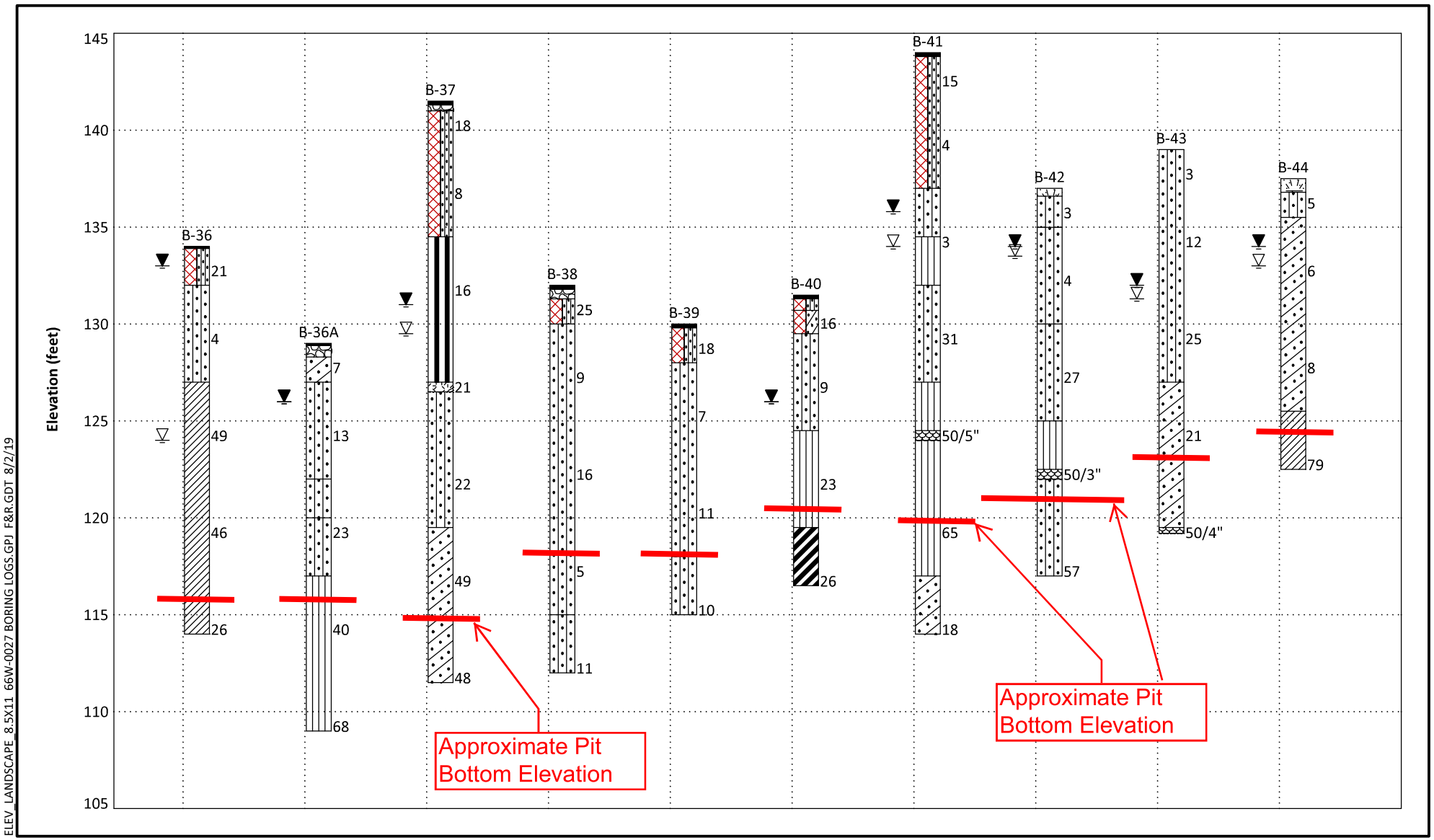
Big Rockfish Creek Outfall

Project No: 66W-0027

Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 8

Project No: 66W-0027

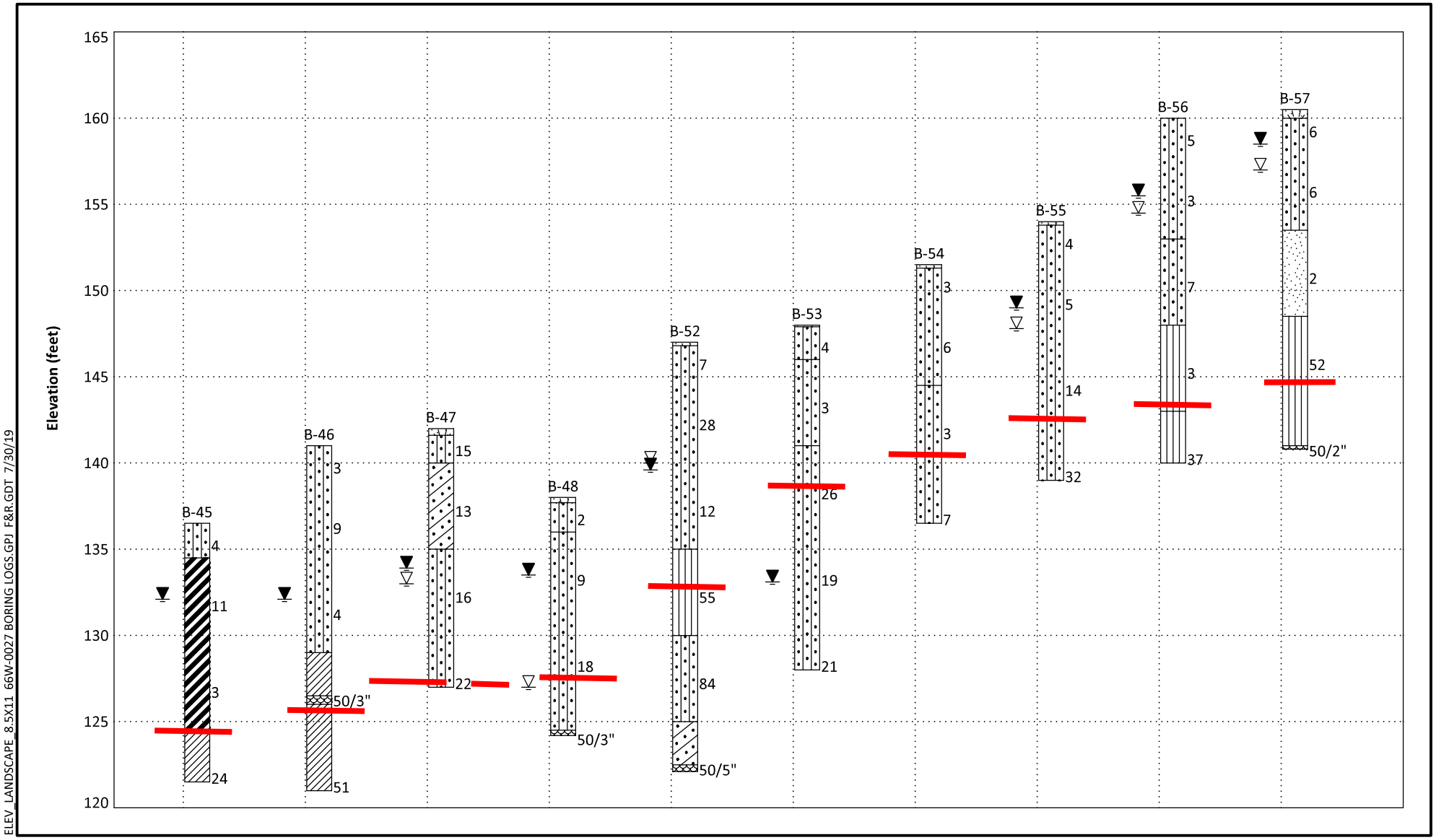
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 7/30/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 9

Project No: 66W-0027

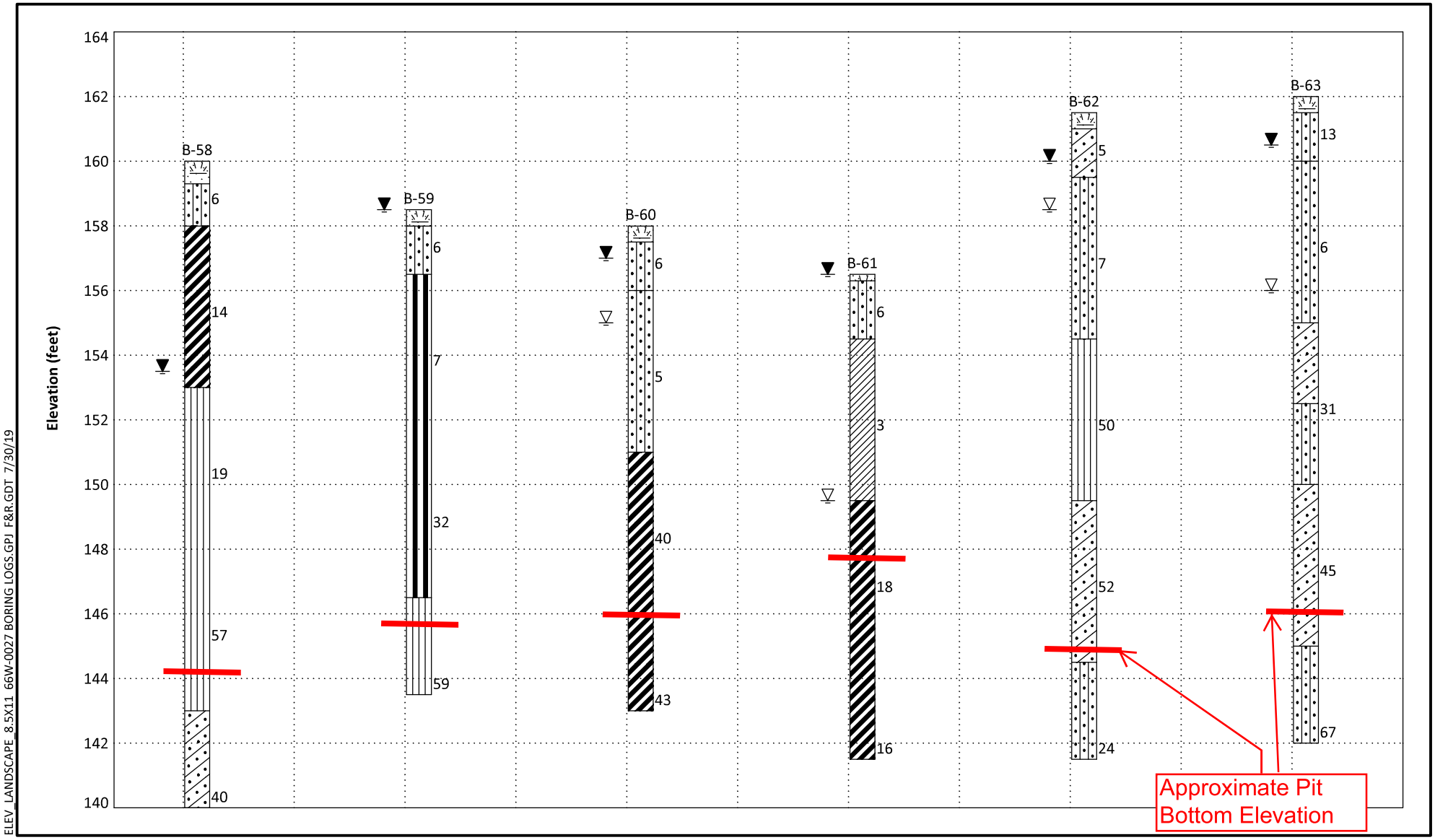
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Big Rockfish Creek Outfall

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 7/30/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 10

Project No: 66W-0027

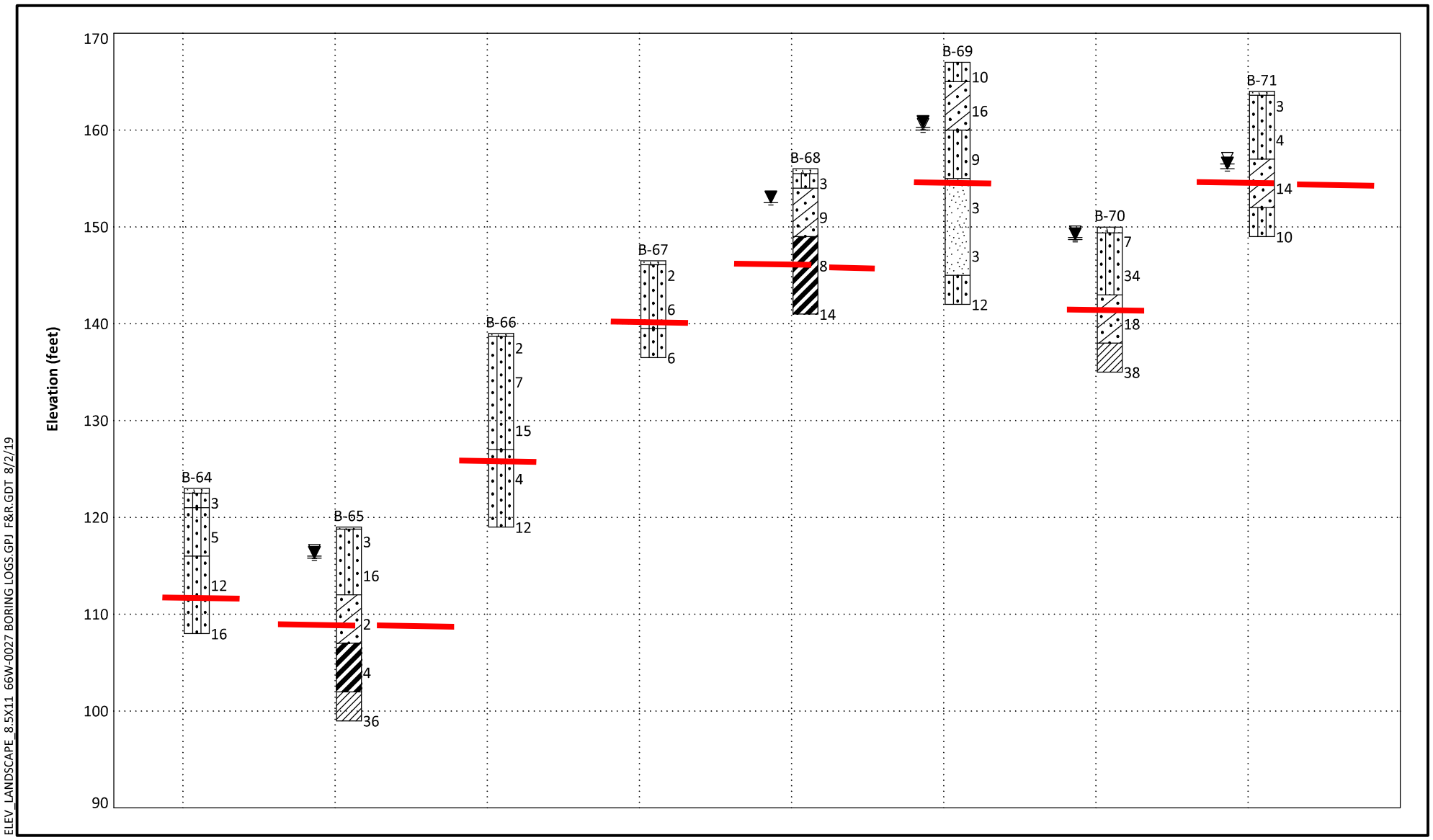
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Camden Woods LS Connections

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 11

Project No: 66W-0027

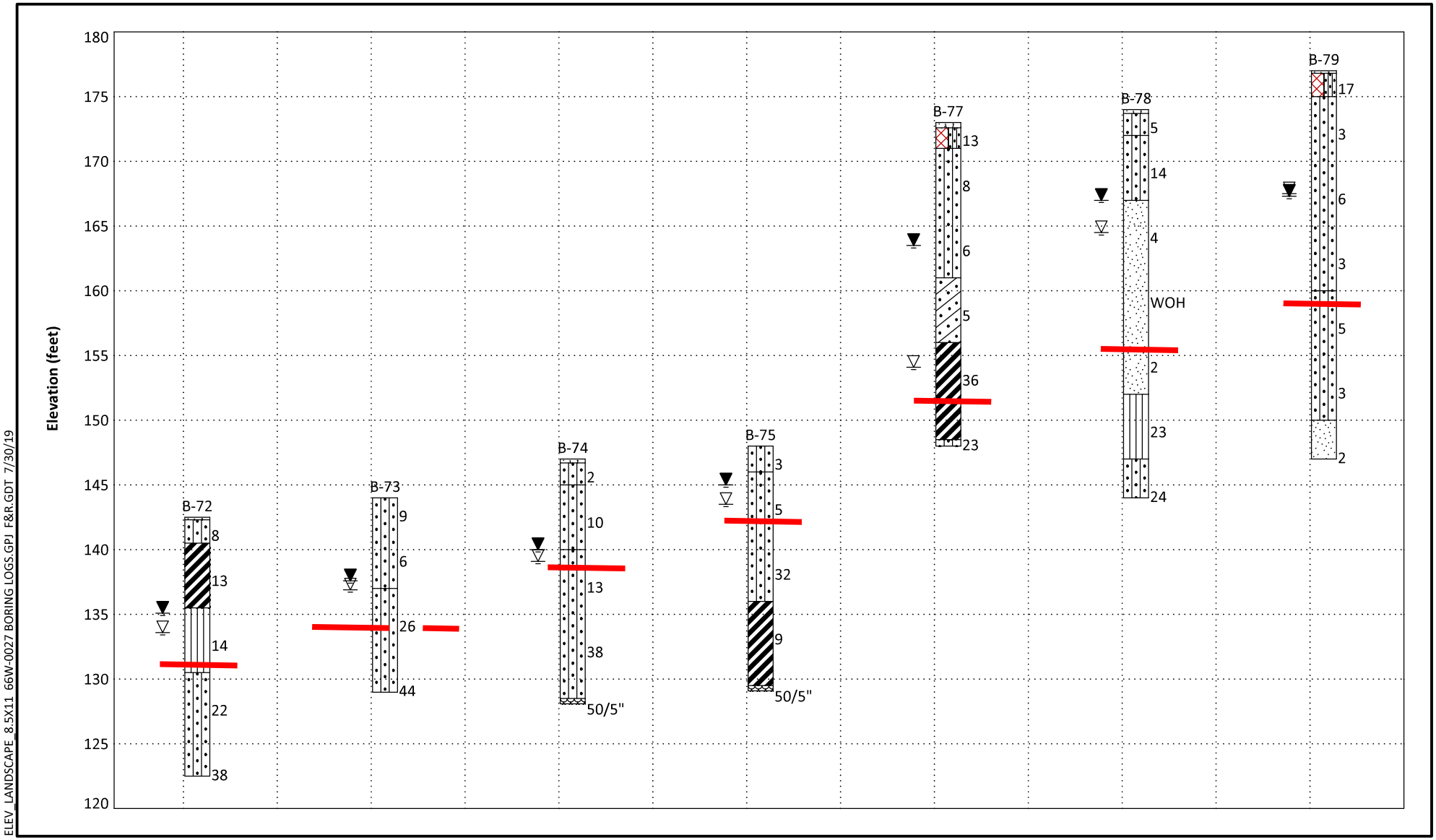
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

Peartree Estates LS Connection

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11 66W-0027 BORING LOGS.GPJ F&R.GDT 7/30/19

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

Profile Name: Figure No. 12

Project No: 66W-0027

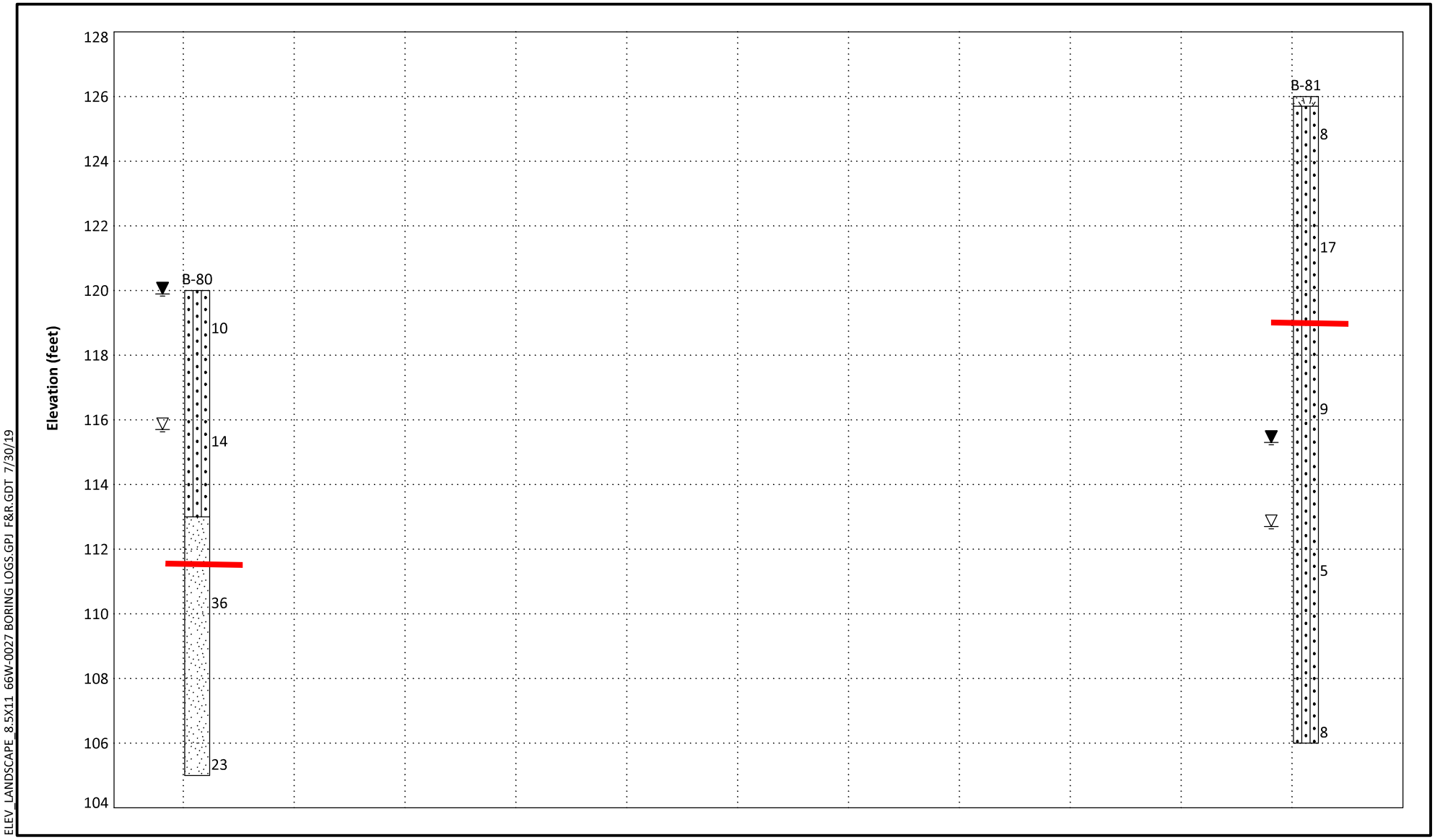
Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC

South Hampton LS Connection

Approximate Invert Elevations



ELEV_LANDSCAPE_8.5X11_66W-0027 BORING LOGS.GPJ F&R.GDT 7/30/19

APPENDIX II

BORING LOGS

66W-0027 Big Rockfish Creek Outfall Boring Coordinates

Boring Number	Northing	Easting
B-1	440999	2007667
B-2	440547	2007131
B-3	440391	2006704
B-4	440324	2006350
B-5	440304	2005826
B-6	440365	2005180
B-7	440369	2004693
B-8	440061	2004144
B-9	439937	2003772
B-10	440082	2003558
B-11	439915	2003284
B-12	440039	2003181
B-13	439574	2002881
B-14	439457	2002238
B-15	439953	2001701
B-16	439854	2001355
B-17	440385	2000792
B-18	440729	1999970
B-19	440761	1999561
B-20	440442	1999128
B-21	440488	1998882
B-22	440504	1998479
B-23	440396	1997807
B-24	440200	1997181
B-25	440172	1996243
B-26	440053	1996066
B-27	439734	1995545
B-28	439730	1995039
B-29	439865	1994627
B-30	439831	1994063
B-31	439826	1993710
B-32	439322	1993525
B-33	439234	1993002
B-34	439280	1992588
B-35	439259	1991841
B-36	438932	1991394
B-36A	438861	1990891
B-37	439041	1990585
B-38	438942	1990064
B-39	439002	1989460
B-40	439429	1989277
B-41	439805	1989477
B-42	440058	1989322
B-43	440680	1989486

Boring Number	Northing	Easting
B-44	441174	1989790
B-45	441937	1989719
B-46	442084	1989337
B-47	442649	1989247
B-48	443030	1989014
B-49	443212	1988663
B-50	443045	1988105
B-51	443418	1987723
B-52	444062	1987954
B-53	444710	1987454
B-54	445177	1987459
B-55	445568	1987392
B-56	446007	1987211
B-57	446483	1987048
B-58	446637	1986696
B-59	446861	1986400
B-60	447198	1986211
B-61	447722	1986071
B-62	448257	1985943
B-63	448291	1985926
B-64	440451	2001502
B-65	441349	2000911
B-66	442041	2000857
B-67	442338	2000181
B-68	442864	1999379
B-69	443441	1999208
B-70	442825	2000136
B-71	443168	1999770
B-72	443449	1989198
B-73	443715	1989548
B-74	444065	1989977
B-75	444161	1990461
B-76	444757	1991406
B-77	444921	1992362
B-78	445508	1993264
B-79	445763	1993788
B-80	440850	2005052
B-81	441204	2005287

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

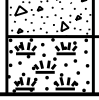
The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-1 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 107.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/4/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
107.2	0.3	SURFICIAL ORGANIC SOILS	1-2-3	0.0	5	GROUNDWATER DATA: 0 Hr: 9.0', Caved at 10.0' 24 Hrs: Dry, Caved at 9.0'
		NATIVE SOILS: Loose, Brown, Moist, Silty Fine to Medium SAND (SM)		1.5		
105.5	2.0	Very Loose, Dark Bown, Moist to Wet, Clayey Silty Fine to Medium SAND (SM)	3-2-2	3.5	4	
				5.0		
100.5	7.0	Medium Dense, Light Gray, Saturated, Silty Fine SAND (SM) with Fine Gravel	5-6-7	8.5	13	
				10.0		
95.5	12.0	Medium Dense to Dense, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	13-16-17	13.5	33	
				15.0		
			17-11-15	18.5	26	
87.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-2 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Loose, Gray to Brown, Moist to Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel (3.5'-5.0')	2-4-5	0.0		GROUNDWATER DATA:
				1.5	9	0 Hr: Dry. Caved at 2.1'
						24 Hrs: 4.0', Caved at 4.9'
	▼	Wet from 3.5'-5'	7-5-3	3.5		
				5.0	8	
97.5	7.0	Very Stiff, Gray, Wet, Fine Very Sandy Silty CLAY (CL) with Trace Mica				
			6-9-13	8.5		
				10.0	22	
92.5	12.0	Dense, Gray, Moist, Silty Clayey Fine SAND (SC) with Trace Mica				
			12-17-22	13.5		
				15.0	39	
			8-15-19	18.5		
84.5	20.0	Boring Terminated at 20 feet.		20.0	34	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-3 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 108 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/5/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
107.6	0.4	SURFICIAL ORGANIC SOILS	1-2-1	0.0	3	GROUNDWATER DATA: 0 Hr: 6.9', Caved at 3.5' 24 Hrs: Dry, Caved at 3.0'
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine SAND (SM)		1.5		
106.0	2.0	Loose, Light Gray, Wet, Fine to Medium SAND (SP) with Trace Silt and Fine Gravel	3-2-3	3.5	5	
				5.0		
101.0	7.0 ▽	Very Loose, Gray, Saturated, Silty Clayey Fine SAND (SC)	2-2-2	8.5	4	
				10.0		
96.0	12.0	Medium Dense, Gray, Saturated, Silty Fine to Coarse SAND (SM)	5-6-6	13.5	12	
				15.0		
91.0	17.0	Very Dense, Gray, Wet, Silty Clayey Fine to Coarse SAND (SC)	16-28-29	18.5	57	
88.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-4 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 111.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/5/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
111.0	0.5	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: 2.1', Caved at 3.5' 24 Hrs: 3.0', Caved at 3.2'
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		
109.5	2.0	Medium Dense, Light Gray, Wet, Very Silty Fine SAND (SM)	2-8-12	3.5	20	
				5.0		
104.5	7.0	Loose, Brown, Saturated, Fine to Medium SAND (SP) with Trace Silt and Fine Gravel	4-4-4	8.5	8	
				10.0		
99.5	12.0	Loose, Gray, Saturated, Silty Fine SAND (SM) with Trace Fine Gravel	2-3-2	13.5	5	
				15.0		
94.5	17.0	Hard, Gray, Wet, Fine Sandy Clayey SILT (MH)	10-9-22	18.5	31	
91.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-5 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 111 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/5/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
110.6	0.4	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: 3.0', Caved at 3.6' 24 Hrs: 2.6', Caved at 3.0'
		NATIVE SOILS: Very Loose to Loose, Brown to Black, Moist to Saturated, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel (3.5'-10.0') and Wood (8.5'-10.0')		1.5		
		Saturated from 3.5'-12'	1-1-2	3.5	3	
				5.0		
			5-5-5	8.5	10	
				10.0		
99.0	12.0	Loose, Light Gray, Saturated, Medium to Coarse SAND (SP) with Trace Silt and Fine Gravel	3-4-6	13.5	10	
				15.0		
94.0	17.0	Hard, Gray, Wet, Fine Sandy CLAY (CH)	12-18-25	18.5	43	
91.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-6 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 111 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/4/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Firm to Stiff, Dark Gray to Light Gray, Moist to Wet, Silty Fine SAND (SM) with Trace Roots	1-3-4	0.0	7	GROUNDWATER DATA: 24 Hrs: 2.1', Caved at 3.4'
				1.5		
		Wet from 3.5'-5.0'	6-6-7	3.5	13	
				5.0		
104.0	7.0	Loose, Dark Brown, Saturated, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	7-6-4	8.5	10	
				10.0		
99.0	12.0	Hard, Gray, Wet, Fine to Medium Very Sandy CLAY (CL)	10-15-23	13.5	38	
				15.0		
94.0	17.0	Very Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	16-25-36	18.5	61	
91.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-7 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 105 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/4/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		POSSIBLE FILL: Loose, Black, Moist, Silty Fine to Medium SAND (SM)	2-2-3	0.0	5	GROUNDWATER DATA: 24 Hrs: 1.6', Caved at 2.4'
				1.5		
103.0	2.0	NATIVE SOILS: Loose, Light Gray, Saturated, Fine to Medium SAND (SP) with Trace Silt and Fine Gravel	3-4-4	3.5	8	
				5.0		
98.0	7.0	Loose, Brown-Gray, Wet, Silty Fine to Coarse SAND (SM) with Trace Wood Fragments	5-4-4	8.5	8	
				10.0		
93.0	12.0	Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	13-20-20	13.5	40	
90.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-8 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 106 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
105.9	0.1	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Medium Dense, Gray, Moist, Very Silty Fine SAND (SM)		1.5		0 Hr: Dry, Caved at 7.5'
			7-8-8	3.5	16	24 Hrs: Dry, Caved at 7.2'
				5.0		
97.5	8.5	Organically Stained Wood	10-21-10	8.5	31	
				10.0		
92.5	13.5	Very Dense, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)	7-24-33	13.5	57	
91.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-9 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
104.4	0.1	SURFICIAL ORGANIC SOILS	1-1-1	0.0		GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Loose, Gray, Moist, Very Silty Fine SAND (SM)			2	0 Hr: Dry, Caved at 8.1'
				1.5		24 Hrs: Dry, Caved at 8.5'
			3-4-3	3.5	7	
				5.0		
97.5	7.0	Hard, Gray, Moist, Clayey Fine Sandy SILT (ML)	10-21-25	8.5	46	
				10.0		
			14-21-24	13.5	45	
89.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 100 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose to Loose, Gray, Moist, Very Silty Fine SAND (SM)	2-1-1	0.0		GROUNDWATER DATA: 0 Hr: Dry, Caved at 15.0' 24 Hrs: 7.3' inside Temporary Observation Well
				1.5	2	
			3-3-4	3.5		
				5.0	7	
93.0	▼7.0	Very Loose to Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Roots and Mica	1-2-2	8.5		
				10.0	4	
			3-5-6	13.5		
				15.0	11	
83.0	17.0	Loose, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Mica	2-3-5	18.5		
				20.0	8	
78.0	22.0	Firm, Brown to Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Mica	2-3-2	23.5		
				25.0	5	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 100 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
			3-3-5	28.5	8	
				30.0		
68.0	32.0	Firm, Gray, Wet, Fine Sandy Very Silty CLAY (CH) with Mica	3-4-4	33.5	8	
				35.0		
			2-3-4	38.5	7	
				40.0		
58.0	42.0	Very Hard, Gray, Wet, Fine Very Sandy SILT (ML) with Trace Mica	10-33-40	43.5	73	
				45.0		
53.0	47.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Coarse SAND (SC) with Trace Fine Gravel	3-5-10	48.5	15	
50.0	50.0	Boring Terminated at 50 feet.		50.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-11 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 102.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
102.4	0.1	SURFICIAL ORGANIC SOILS	2-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: 14.1', Caved at 5.5' Backfilled Immediately After Drilling Completion
		NATIVE SOILS: Loose, Tan, Moist, Very Silty Fine SAND (SM) with Trace Fine Gravel		1.5		
			3-2-4	3.5	6	
				5.0		
95.5	7.0	Very Dense, Gray, Wet, Slightly Clayey Very Silty Fine to Medium SAND (SM)	24-23-30	8.5	53	
				10.0		
90.5	12.0	Hard, Gray, Moist, Fine Sandy Silty CLAY (CL)	18-21-24	13.5	45	
				15.0		
85.5	17.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Fine Gravel and Mica	8-11-12	18.5	23	
82.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-12 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 109.5 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 7/25/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Loose, Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	2-1-4	0.0	5	GROUNDWATER DATA: 0 Hr: Dry inside Temporary Observation Well 24 Hrs: 10.6' inside Temporary Observation Well
				1.5		
107.5	2.0	Medium Dense, Brown, Wet, Medium to Coarse SAND (SP) with Trace Silt and Fine Gravel	6-6-6	3.5	12	
				5.0		
102.5	7.0	Medium Dense to Very Dense, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	10-12-14	8.5	26	
				10.0		
			15-26-34	13.5	60	
				15.0		
92.5	17.0	Very Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)	14-26-31	18.5	57	
				20.0		
87.5	22.0	Loose to Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Mica	4-4-6	23.5	10	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-12 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 109.5 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 7/25/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
			4-4-7	28.5	11	
				30.0		
77.5	32.0	Loose, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	2-2-3	33.5	5	
				35.0		
			5-5-5	38.5	10	
				40.0		
67.5	42.0	Very Stiff, Gray-Brown, Wet, Fine to Medium Sandy Silty CLAY (CL) with Trace Mica	6-10-17	43.5	27	
				45.0		
62.5	47.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Mica	5-6-10	48.5	16	
59.5	50.0	Boring Terminated at 50 feet.		50.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-13 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 109 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/11/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
108.5	0.5	SURFICIAL ORGANIC SOILS	1-1-3	0.0	4	GROUNDWATER DATA: 0 Hr: 3.7', Caved at 4.1' 24 Hrs: Dry, Caved at 13.0'
		NATIVE SOILS: Very Loose to Loose, Brown, Moist to Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
		Wet from 3.5'-5.0'	6-5-4	3.5	9	
				5.0		
102.0	7.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CH)	8-12-16	8.5	28	
				10.0		
97.0	12.0	Very Hard, Gray, Wet, Fine to Medium Sandy Silty CLAY (CL)	16-24-33	13.5	57	
94.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-14 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 111 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/11/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
110.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots and Fine Gravel		1.5		0 Hr: 5.0', Caved at 8.5'
109.0	2.0	Loose, Brown, Wet, Poorly Graded SAND (SP) with Trace Silt and Fine Gravel	2-3-4	3.5	7	24 Hrs: 5.0', Caved at 7.0'
		▽		5.0		
104.0	7.0	Stiff, Dark Gray, Wet, Fine Sandy CLAY (CH)	5-4-8	8.5	12	
				10.0		
99.0	12.0	Loose, Gray, Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	3-4-4	13.5	8	
96.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-15 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 116 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose to Loose, Black to Brown, Moist, Silty Fine to Coarse SAND (SM) with Trace Roots (0.0-1.5')	2-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: 6.0', Caved at 6.5' 24 Hrs: 6.0', Caved at 7.0'
				1.5		
			2-3-2	3.5	5	
				5.0		
109.0	7.0	Soft, Dark Gray, Wet, Fine Sandy CLAY (CH)	1-2-2	8.5	4	
				10.0		
104.0	12.0	Stiff to Very Stiff, Gray, Wet, Fine Sandy Clayey SILT (MH)	4-4-9	13.5	13	
				15.0		
			3-7-11	18.5	18	
96.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-16 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 111 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
110.7	0.3	SURFICIAL ORGANIC SOILS	2-2-3	0.0	5	GROUNDWATER DATA: 0 Hr: 5.5', Caved at 5.8' 24 Hrs: Dry, Caved at 5.6'
		NATIVE SOILS: Loose, Brown, Moist to Wet, Silty Fine to Medium SAND (SM)		1.5		
		Wet from 3.5'	4-4-5	3.5	9	
				5.0		
104.0	7.0	Dense, Dark Gray, Wet, Silty Clayey Fine to Coarse SAND (SC) with Trace Mica	10-12-19	8.5	31	
				10.0		
			12-15-17	13.5	32	
96.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-17 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 121 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
120.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: 20.0', Caved at 11.5' 24 Hrs: Dry, Caved at 11.5'
		NATIVE SOILS: Very Loose to Medium Dense, Tan to Gray, Moist to Wet, Very Silty Fine to Coarse SAND (SM) with Trace Fine Gravel (13.5'-15.0')		1.5		
			3-4-3	3.5	7	
				5.0		
			4-6-5	8.5	11	
				10.0		
		Wet from 13.5'	1-2-3	13.5	5	
				15.0		
104.0	17.0	Firm, Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Organics	1-3-5	18.5	8	
101.0	▽20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-18 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 120 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/18/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
119.6	0.4	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA:
		NATIVE SOILS: Soft, Gray, Moist, Fine Sandy Clayey SILT (ML) with Trace Roots		1.5		0 Hr: 7.4' inside Temporary Observation Well
118.0	2.0	Loose, Gray, Wet, Very Silty Fine SAND (SM)	4-4-4	3.5	8	24 Hrs: 6.6' inside Temporary Observation Well
				5.0		
113.0	7.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CH)	5-8-10	8.5	18	
				10.0		
			6-12-17	13.5	29	
				15.0		
103.0	17.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CL)	8-10-15	18.5	25	
100.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-19 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 127 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/18/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose, Dark Brown, Moist, Silty Fine SAND (SM)	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: 3.8', Caved at 4.5' 24 Hrs: 3.9', Caved at 4.5'
				1.5		
125.0	2.0	Loose, Gray, Wet, Silty Fine SAND (SM)				
			3-4-5	3.5	9	
				5.0		
120.0	7.0	Medium Dense, Tan, Wet, Very Silty Fine SAND (SM)				
			3-5-6	8.5	11	
				10.0		
115.0	12.0	Medium Dense, White to Brown, Wet, Silty Fine to Coarse SAND (SM)				
			8-11-14	13.5	25	
				15.0		
			3-5-7	18.5	12	
107.5	19.5	Medium Dense, Black, Moist, Very Silty Fine SAND (SM)		20.0		
105.0	22.0	Medium Dense, White, Wet, Poorly Graded SAND (SP) with Trace Silt				
			5-10-8	23.5	18	
102.0	25.0	Boring Terminated at 25 feet.		25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-20 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 121 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/10/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
120.5	0.5	SURFICIAL ORGANIC SOILS	1-1-3	0.0	4	GROUNDWATER DATA: 0 Hr: Dry, Caved at 8.0' 24 Hrs: Dry, Caved at 8.0'
		NATIVE SOILS: Very Loose to Medium Dense, Gray, Moist, Silty Fine SAND (SM)		1.5		
			7-6-9	3.5	15	
				5.0		
114.0	7.0	Loose to Medium Dense, Gray, Saturated to Wet, Fine to Medium SAND (SP)	5-5-7	8.5	12	
				10.0		
		Wet from 13.5'-15'	4-3-4	13.5	7	
				15.0		
104.0	17.0	Very Stiff, Dark Gray, Wet, Fine Sandy CLAY (CH)	3-7-11	18.5	18	
101.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-21 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 121 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/10/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
120.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry, Caved at 10.0' 24 Hrs: Dry, Caved at 10.0'
		NATIVE SOILS: Very Loose to Medium Dense, Gray, Moist to Wet, Silty Fine SAND (SM)		1.5		
		Wet from 3.5'-5.0'	4-6-8	3.5	14	
				5.0		
114.0	7.0	Very Soft to Soft, Dark Gray, Wet, Fine Sandy Clayey SILT (ML) with Organics	1-1-1	8.5	2	
				10.0		
			2-2-1	13.5	3	
				15.0		
104.0	17.0	Medium Dense, Dark Gray, Wet, Silty Clayey Fine to Coarse SAND (SC)	5-10-11	18.5	21	
101.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-22 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 116 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/10/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
115.0	1.0	NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	1-1-3	0.0	4	GROUNDWATER DATA: 0 Hr: 18.0' inside Temporary Observation Well 24 Hrs: 4.0' inside Temporary Observation Well
		Very Loose, Gray, Wet, Clayey Silty Fine to Coarse SAND (SM)		1.5		
113.0	3.0	Very Loose, Gray, Wet, Silty Fine to Medium SAND (SM) with Organics	3-1-4	3.5	5	
111.5	4.5	Firm, Gray, Wet, Fine Sandy CLAY (CH)		5.0		
109.0	7.0	Very Stiff, Gray, Wet, Fine Very Sandy Silty CLAY (CL)	4-7-9	8.5	16	
				10.0		
104.0	12.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CH) with Wood	4-6-10	13.5	16	
				15.0		
99.0	17.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Coarse SAND (SC)	6-8-9	18.5	17	
96.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-25 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 137 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	2-5-9	0.0	14	GROUNDWATER DATA: 0 Hr: 7.0', Caved at 12.5' 24 Hrs: 5.0', Caved at 7.5'
135.0	2.0	Loose, Gray-Brown, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Roots		1.5		
			2-2-3	3.5	5	
				5.0		
130.0	7.0	Very Loose, Gray, Wet, Wood and Silty Clayey Fine SAND (SC)				
			2-1-1	8.5	2	
				10.0		
125.0	12.0	Medium Dense, Light Gray, Saturated, Fine SAND (SP) with Silt and Trace Fine Gravel		13.5		
			11-6-6		12	
				15.0		
120.0	17.0	Loose, Dark Brown, Wet, Silty Fine to Medium SAND (SM)				
			11-2-5	18.5	7	
117.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-26 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 124 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
123.7	0.3	SURFICIAL ORGANIC SOILS	2-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: 4.5', Caved at 9.0' 24 Hrs: 4.0', Caved at 4.5'
		NATIVE SOILS: Loose, Brown, Moist, Silty Fine to Medium SAND (SM)		1.5		
122.0	2.0	Very Loose to Medium Dense, Gray, Wet, Silty Fine SAND (SM)	2-2-2	3.5	4	
				5.0		
			5-7-6	8.5	13	
				10.0		
112.0	12.0	Loose, Gray, Saturated, Silty Fine to Coarse SAND (SM) with Fine Gravel	4-4-4	13.5	8	
				15.0		
107.0	17.0	Loose, Gray, Wet, Fine to Medium SAND (SP) with Silt and Fine to Coarse Gravel	4-3-4	18.5	7	
104.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-27 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 122.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
122.3	0.2	ASPHALT	7-6-5	0.0	11	GROUNDWATER DATA: 0 Hr: 7.5' inside Temporary Observation Well 24 Hrs: 7.5' inside Temporary Observation Well
121.9	0.6	FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
		NATIVE SOILS: Loose to Medium Dense, Light Gray, Wet, Very Silty Fine SAND (SM)	3-3-5	3.5	8	
				5.0		
115.5	7.0	Medium Dense to Very Dense, Dark Gray, Wet, Silty Fine to Medium SAND (SM)	5-6-6	8.5	12	
		Noted Fine to Coarse Gravel from 8.5'-10.0'		10.0		
			20-30-27	13.5	57	
107.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-28 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 128.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
128.3	0.2	ASPHALT	6-7-8	0.0	15	GROUNDWATER DATA: 0 Hr: 9.0' inside Temporary Observation Well 24 Hrs: 4.0' inside Temporary Observation Well
		FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
125.5	3.0	Dense, Gray, Wet, Wood and Clayey Silty Fine to Coarse SAND (SC)	9-18-19	3.5	37	
				5.0		
121.5	7.0	NATIVE SOILS: Medium Dense, Brown and Gray, Saturated, Very Silty Fine SAND (SM)	3-6-5	8.5	11	
				10.0		
116.5	12.0	Medium Dense, Orange-Maroon, Wet, Silty Clayey Fine to Coarse SAND (SC)	8-11-13	13.5	24	
				15.0		
111.5	17.0	Medium Dense, Light Gray, Saturated, Slightly Clayey Silty Fine to Coarse SAND (SM)	8-8-11	18.5	19	
108.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-29 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 129 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
128.8	0.2	ASPHALT	4-8-11	0.0	19	GROUNDWATER DATA: 0 Hr: 10.0' inside Temporary Observation Well 24 Hrs: 4.5' inside Temporary Observation Well
		FILL: Medium Dense, Brown, Moist, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5		
127.0	2.0	NATIVE SOILS: Very Loose, Gray, Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	WOH-WOH-1	3.5	1	
				5.0		
122.0	7.0	Dense, Light Gray, Moist, Very Silty Fine SAND (SM)	15-25-18	8.5	43	
				10.0		
117.0	12.0	Very Hard, Gray, Moist, Fine Sandy SILT (ML)	38-39-33	13.5	72	
				15.0		
112.0	17.0	Dense, Gray, Wet, Clayey Silty Fine to Coarse SAND (SM)	8-16-17	18.5	33	
109.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-30 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 132.5 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
132.0	0.5	SURFICIAL ORGANIC SOILS	WOH-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: 4.5', Caved at 7.0' 24 Hrs: 3.0', Caved at 5.0'
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine to Coarse SAND (SM) with 1/4" Diameter Roots		1.5		
130.5	2.0	Very Loose, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM)	2-1-1	3.5	2	
				5.0		
125.5	7.0	Firm to Very Hard, Light Gray and Brown, Wet, Fine Sandy Clayey SILT (ML)	4-2-4	8.5	6	
				10.0		
			25-24-22	13.5	46	
				15.0		
113.5	19.0	Very Dense to Dense, Gray, Saturated, Silty Fine to Medium SAND (SM)	15-29-29	18.5	58	
				20.0		
			18-17-22	23.5	39	
107.5	25.0	Boring Terminated at 25 feet.		25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-31 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 134 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.3	0.7	NATIVE SOILS: Loose, Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	2-3-4	0.0	7	GROUNDWATER DATA: 0 Hr: 4.5', Caved at 5.0' 24 Hrs: 4.0', Caved at 4.1'
		Loose, Brown to Gray, Moist to Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5		
			5-3-4	3.5	7	
				5.0		
127.0	7.0	Loose, Gray, Saturated, Fine SAND (SP) with Silt				
			4-5-4	8.5	9	
				10.0		
122.0	12.0	Organically Stained Wood				
			1-1-3	13.5	4	
119.5	14.5	Very Loose, Dark Gray, Saturated, Very Silty Fine SAND (SM) with Trace Organics		15.0		
117.0	17.0	Medium Dense, Gray to Brown, Wet to Saturated, Very Silty Fine SAND (SM)	8-11-11	18.5	22	
				20.0		
		Saturated from 23.5'-25.0'	8-10-12	23.5	22	
109.0	25.0	Boring Terminated at 25 feet.		25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-32 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 128 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
127.7	0.3	SURFICIAL ORGANIC SOILS	3-4-3	0.0	7	GROUNDWATER DATA: 0 Hr: 10.0' inside Temporary Observation Well 24 Hrs: 7.5' inside Temporary Observation Well
		NATIVE SOILS: Very Loose to Loose, Gray to Light Gray, Moist, Very Silty Fine SAND (SM)		1.5		
			2-2-1	3.5	3	
				5.0		
121.0	7.0	Dense, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)				
			7-22-25	8.5	47	
				10.0		
116.0	12.0	Medium Dense to Dense, Light Gray, Saturated, Fine to Medium SAND (SP) with Silt				
			10-11-10	13.5	21	
				15.0		
			14-23-14	18.5	37	
108.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-33 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 125.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
125.2	0.3	SURFICIAL ORGANIC SOILS	2-3-2	0.0	5	GROUNDWATER DATA:
		NATIVE SOILS: Loose, Brown to Black, Moist, Silty Fine to Medium SAND (SM) with Trace Roots		1.5		0 Hr: 3.0' inside Temporary Observation Well
123.5	2.0	Medium Dense, Brown, Wet, Very Silty Fine SAND (SM)				24 Hrs: 2.0' inside Temporary Observation Well
		Noted Petroleum Odor at 3.5'-5'	4-6-7	3.5	13	
				5.0		
118.5	7.0	Dense, Light Gray, Wet, Silty Fine to Medium SAND (SM)	9-14-19	8.5	33	
				10.0		
113.5	12.0	Medium Dense, Light Gray, Saturated, Fine to Medium SAND (SP) with Silt	6-6-10	13.5	16	
110.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-34 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 137 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/27/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
136.9	0.1	SURFICIAL ORGANIC SOILS	1-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: 4.0', Caved at 5.0' Boring Backfilled Immediately After Drilling Completion
		NATIVE SOILS: Very Loose to Dense, Brown to Gray, Moist to Saturated, Silty Fine to Medium SAND (SM)		1.5		
		Wet from 3.5'-13.5'	6-8-10	3.5	18	
				5.0		
			4-1-1	8.5	2	
				10.0		
		Saturated from 13.5'	3-14-18	13.5	32	
				15.0		
120.0	17.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CL)	6-11-14	18.5	25	
				20.0		
115.0	22.0	Very Dense, Gray, Wet, Silty Fine to Medium SAND (SM)	11-32-47	23.5	79	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-34 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 137 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/27/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
110.0	27.0	Hard, Dark Gray, Wet, Fine Sandy Clayey SILT (ML)	10-12-27	28.5	39	
107.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-36 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 134 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.9	0.1	Asphalt	6-11-10	0.0	21	GROUNDWATER DATA:
		FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		0 Hr: 10.0' inside Temporary Observation Well
132.0	2.0	NATIVE SOILS: Very Loose, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	5-2-2	3.5	4	24 Hrs: 1.0' inside Temporary Observation Well
				5.0		
127.0	7.0	Very Stiff to Hard, Gray, Wet, Fine Sandy Silty CLAY (CL)	12-23-26	8.5	49	
				10.0		
			11-19-27	13.5	46	
				15.0		
			7-10-16	18.5	26	
114.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-36A (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 129 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
128.9	0.1	Asphalt	6-4-3	0.0	7	GROUNDWATER DATA: 0 Hr: 3.0', Caved at 14.0' 24 Hrs: 3.0', Caved at 3.5'
128.3	0.7	BASE: Silty Fine to Medium SAND with Fine to Coarse Rock Fragments		1.5		
127.0	2.0	NATIVE SOILS: Loose, Gray-Brown, Wet, Silty Clayey Fine to Medium SAND (SC)				
		Medium Dense, Gray, Wet, Very Silty Fine SAND (SM)	6-5-8	3.5	13	
				5.0		
122.0	7.0	Medium Dense, Brown-Orange, Wet, Silty Fine to Medium SAND (SM) with Fine to Coarse Quartz Fragments	12-9-14	8.5	23	
120.0	9.0	Medium Dense, Gray-Brown, Wet, Clayey Silty Fine to Medium SAND (SM)		10.0		
117.0	12.0	Hard to Very Hard, Light Gray-Pink to Dark Gray, Wet, Fine to Medium Sandy Clayey SILT (ML)	16-18-22	13.5	40	
				15.0		
			13-29-39	18.5	68	
109.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-37 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 141.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
141.3	0.2	Asphalt	7-8-10	0.0	18	GROUNDWATER DATA: 0 Hr: 12.0' inside Temporary Observation Well 24 Hrs: 10.5' inside Temporary Observation Well
141.0	0.5	BASE: Silty Fine SAND with Fine to Coarse Rock Fragments		1.5		
		FILL: Loose to Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel (0.5'-1.5')	5-4-4	3.5	8	
				5.0		
134.5	7.0	NATIVE SOILS: Very Stiff, Dark Gray, Wet, Fine Sandy Clayey SILT (MH)	3-6-10	8.5	16	
				10.0		
			12-13-8	13.5	21	
127.0	14.5	Wood				
126.5	15.0	Medium Dense, Brown, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)		15.0		
			3-8-14	18.5	22	
				20.0		
119.5	22.0	Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	10-21-28	23.5	49	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-37 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 141.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
			17-20-28	28.5	48	
111.5	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-38 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 132 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/27/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
131.8	0.2	Asphalt	18-13-12	0.0	25	GROUNDWATER DATA: 0 Hr: Dry, Caved at 12.0' 24 Hrs: Dry, Caved at 12.0'
131.3	0.7	BASE: Silty Fine SAND with Fine to Coarse Rock Fragments		1.5		
130.0	2.0	FILL: Medium Dense, Black, Moist, Silty Fine to Medium SAND (SM)				
		NATIVE SOILS: Loose to Medium Dense, Brown to Gray, Moist to Wet, Very Silty Fine SAND (SM)	5-4-5	3.5	9	
				5.0		
			7-6-10	8.5	16	
				10.0		
		Wet from 13.5'-15.0'	3-3-2	13.5	5	
				15.0		
115.0	17.0	Medium Dense, Brown, Wet, Silty Fine to Medium SAND (SM) with Wood Fragments	3-3-8	18.5	11	
112.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-39 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 130 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
129.8	0.2	Asphalt	4-6-12	0.0	18	GROUNDWATER DATA:
		FILL: Medium Dense, Brown to Gray, Moist, Silty Fine to Medium SAND (SM)		1.5		0 Hr: Dry, Caved at 10.0'
128.0	2.0	NATIVE SOILS: Loose to Medium Dense, Gray, Moist, Very Silty Fine SAND (SM)	3-4-3	3.5	7	24 Hrs: Dry, Caved at 10.0'
				5.0		
			6-6-5	8.5	11	
				10.0		
118.0	12.0	Loose, Brown, Saturated, Silty Fine SAND (SM) with Fine to Coarse Gravel	4-5-5	13.5	10	
115.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-40 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 131.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
131.3	0.2	Asphalt	9-9-7	0.2		GROUNDWATER DATA:
130.7	0.8	FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots			16	0 Hr: 5.5' inside Temporary Observation Well
129.5	2.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)		1.7		24 Hrs: 5.5' inside Temporary Observation Well
		NATIVE SOILS: Loose, Light Gray, Moist, Very Silty Fine SAND (SM)	4-5-4	3.5	9	
				5.0		
124.5	7.0	Very Stiff, Gray, Wet, Fine Sandy Clayey SILT (ML)	2-7-16	8.5	23	
				10.0		
119.5	12.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CH)	6-11-15	13.5	26	
116.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-41 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 144 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
143.8	0.2	Asphalt	6-7-8	0.2	15	GROUNDWATER DATA: 0 Hr: 10.0', Caved at 12.0' 24 Hrs: 8.2', Caved at 9.0'
		FILL: Very Loose to Medium Dense, Brown to Gray, Moist, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Roots (3.5'-5.0')		1.7		
			2-2-2	3.5	4	
				5.0		
137.0	7.0	NATIVE SOILS: Very Loose, Gray, Wet, Very Silty Fine SAND (SM)				
			4-1-2	8.5	3	
134.5	9.5	Soft, Gray, Wet, Fine Sandy Clayey SILT (ML)		10.0		
132.0	12.0	Dense, Gray-Brown, Saturated, Silty Fine SAND (SM) with Trace Fine Gravel				
			13-16-15	13.5	31	
				15.0		
127.0	17.0	Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)				
			11-31-50/5"	18.5	100+	
124.5	19.5					
124.0	20.0	PARTIALLY WEATHERED ROCK: Sampled as Gray, Fine Sandy Clayey SILT		19.9		
		Very Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)				
			18-29-36	23.5	65	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-41 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 144 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
117.0	27.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	4-5-13	28.5	18	
114.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-42 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 137 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
136.6	0.4	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: 3.5' inside Temporary Observation Well 24 Hrs: 3' inside Temporary Observation Well
		NATIVE SOILS: Very Loose, Gray, Moist, Silty Fine SAND (SM)		1.5		
135.0	2.0	Very Loose, Gray, Wet, Slightly Clayey Silty Fine to Medium SAND (SM)	1-2-2	3.5	4	
				5.0		
130.0	7.0	Medium Dense, Brown, Wet, Silty Fine to Coarse SAND (SM)	15-16-11	8.5	27	
				10.0		
125.0	12.0	Very Hard, Gray, Wet, Fine Sandy Clayey SILT (ML)	18-37-50/3"	13.5	100+	
122.5	14.5	PARTIALLY WEATHERED ROCK: Sampled as Gray, Fine Sandy Clayey SILT		14.8		
122.0	15.0	Very Dense, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)	12-25-32	18.5	57	
117.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-43 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 139 ±
Total Depth: 19.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose to Medium Dense, Gray to Brown, Moist to Wet, Silty Fine to Medium SAND (SM) with Trace Roots (0.0-1.5')	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: 7.7', Caved at 8.9' 24 Hrs: 7.0', Caved at 8.0'
				1.5		
		Wet from 3.5'-10.0'	3-5-7	3.5	12	
				5.0		
			7-11-14	8.5	25	
				10.0		
127.0	12.0	Medium Dense, Tan to Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Fine Gravel	10-10-11	13.5	21	
				15.0		
			7-21-50/4"	18.5	100+	
119.5	19.5					
119.2	19.8	PARTIALLY WEATHERED ROCK: Sampled as Gray, Silty Clayey Fine to Medium SAND with Trace Fine Gravel		19.9		
		Boring Terminated at 19.8 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-44 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 137.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/21/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
136.8	0.7	SURFICIAL ORGANIC SOILS	2-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: 4.5', Caved at 10.0' 24 Hrs: 3.5', Caved at 6.0'
		NATIVE SOILS: Loose, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots		1.5		
135.5	2.0	Loose, Brown and Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Fine Gravel	2-3-3	3.5	6	
				5.0		
			1-2-6	8.5	8	
				10.0		
125.5	12.0	Very Hard, Gray, Wet, Fine Sandy Silty CLAY (CL)	35-40-39	13.5	79	
122.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-45 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 136.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose, Tan, Moist, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Roots	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: Dry, Caved at 5.1' 24 Hrs: 4.4', Caved at 10.2'
				1.5		
134.5	2.0	Soft to Stiff, Gray to Dark Gray, Wet, Fine Sandy CLAY (CH) with Wood Fragments (3.5'-5.0')	3-5-6	3.5	11	
				5.0		
			1-1-2	8.5	3	
				10.0		
124.5	12.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CL)	4-10-14	13.5	24	
121.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-46 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 141 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose to Loose, Brown to Gray, Moist to Wet, Very Silty Fine to Medium SAND (SM) with Trace Roots (0.0-1.5')	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry, Caved at 8.1' 24 Hrs: 8.9', Caved at 9.6'
				1.5		
		Wet from 3.5'-12'	3-4-5	3.5	9	
				5.0		
	▼		5-2-2	8.5	4	
				10.0		
129.0	12.0	Very Hard, Gray, Moist, Fine Sandy CLAY (CL)	12-50-50/3"	13.5	100+	
126.5	14.5	PARTIALLY WEATHERED ROCK: Sampled as Gray, Fine Sandy CLAY		14.8		
126.0	15.0	Very Hard, Gray, Moist, Fine Sandy Silty CLAY (CL) with Trace Mica	12-21-30	18.5	51	
121.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-47 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 142 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
141.6	0.4	SURFICIAL ORGANIC SOILS	3-7-8	0.0	15	GROUNDWATER DATA: 0 Hr: 9.0', Caved at 9.7' 24 Hrs: 8.1', Caved at 9.5'
		NATIVE SOILS: Medium Dense, Tan, Moist, Silty Fine to Medium SAND (SM)		1.5		
140.0	2.0	Medium Dense, Tan, Moist, Silty Clayey Fine to Medium SAND (SC)	5-6-7	3.5	13	
				5.0		
135.0	7.0	Medium Dense, Tan to Brown, Wet to Saturated, Slightly Clayey Silty Fine to Coarse SAND (SM)	8-7-9	8.5	16	
				10.0		
		Saturated from 13.5'-15.0'	4-8-14	13.5	22	
127.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-48 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 138 ±
Total Depth: 13.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
137.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: 11.0', Caved at 5.0' 24 Hrs: 4.5', Caved at 5.5'
		NATIVE SOILS: Very Loose, Tan, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		
136.0	2.0	Loose to Medium Dense, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	3-4-5	3.5	9	
				5.0		
			14-6-12	8.5	18	
				10.0		
124.5	13.5		50/3"	13.5		
124.2	13.8	PARTIALLY WEATHERED ROCK: Sampled as Gray-Brown, Silty Clayey Fine to Medium SAND			100+	
		Boring Terminated at 13.8 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-52 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 147 ±
Total Depth: 24.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/26/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
146.8	0.2	SURFICIAL ORGANIC SOILS	2-3-4	0.0	7	GROUNDWATER DATA: 0 Hr: 7.0' inside Temporary Observation Well 24 Hrs: 7.4' inside Temporary Observation Well
		NATIVE SOILS: Loose to Medium Dense, Brown, Moist to Wet, Silty Fine to Medium SAND (SM)		1.5		
			15-16-12	3.5	28	
				5.0		
		Wet from 8.5'-10.0'	12-9-3	8.5	12	
				10.0		
135.0	12.0	Very Hard, Gray, Moist, Fine Very Sandy Clayey SILT (ML)	11-18-37	13.5	55	
				15.0		
130.0	17.0	Very Dense, Brown, Moist, Silty Fine to Medium SAND (SM)	41-50-34	18.5	84	
				20.0		
125.0	22.0	Very Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	24-43-50/5"	23.5	100+	
122.5	24.5					
122.1	24.9	PARTIALLY WEATHERED ROCK: Sampled as Gray, Silty Clayey Fine to Medium SAND		24.9		
		Boring Terminated at 24.9 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

BORING_LOG 66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-53 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 148 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/26/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
147.9	0.1	SURFICIAL ORGANIC SOILS	2-2-2	0.0	4	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		0 Hr: Dry inside Temporary Observation Well
146.0	2.0	Very Loose, Dark Gray, Wet, Clayey Silty Fine SAND (SM)	1-1-2	3.5	3	24 Hrs: 14.9' inside Temporary Observation Well
				5.0		
141.0	7.0	Medium Dense, Brown to Gray, Wet, Slightly Clayey Silty Fine to Medium SAND (SM)	12-14-12	8.5	26	
				10.0		
			3-8-11	13.5	19	
		▼		15.0		
			10-12-9	18.5	21	
128.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-54 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 151.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/26/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
151.3	0.2	SURFICIAL ORGANIC SOILS	2-1-2	0.0	3	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Loose, Brown, Moist, Very Silty Fine SAND (SM)		1.5		0 Hr: Dry, Caved at 9.0'
			2-3-3	3.5	6	24 Hrs: Dry, Caved at 9.4'
				5.0		
144.5	7.0	Very Loose to Loose, Brown to Orange, Wet, Slightly Clayey Very Silty Fine to Medium SAND (SM)	1-2-1	8.5	3	
				10.0		
			2-3-4	13.5	7	
136.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-55 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 154 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/26/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
153.8	0.2	SURFICIAL ORGANIC SOILS	2-2-2	0.0	4	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Medium Dense, Brown, Moist to Wet, Silty Fine to Medium SAND (SM)		1.5		0 Hr: 6.2' inside Temporary Observation Well
		Noted Trace Roots from 0.0-1.5'				24 Hrs: 5.0' inside Temporary Observation Well
		Wet from 3.5'-15.0'	2-2-3	3.5	5	
				5.0		
			3-6-8	8.5	14	
				10.0		
			15-14-18	13.5	32	
139.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-56 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 160 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/1/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose to Loose, Black to Brown, Moist to Wet, Silty Fine SAND (SM) with Trace Roots (0-1.5')	2-2-3	0.0 1.5	5	GROUNDWATER DATA: 0 Hr: 5.5' inside Temporary Observation Well 24 Hrs: 4.5' inside Temporary Observation Well
		Wet from 3.5'-5.0'	1-2-1	3.5 5.0	3	
153.0	7.0	Loose, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)	2-4-3	8.5 10.0	7	
148.0	12.0	Soft, Gray, Wet, Fine Sandy SILT (ML) with Trace Mica	1-1-2	13.5 15.0	3	
143.0	17.0	Hard, Dark Gray, Wet, Fine Sandy Clayey SILT (ML) with Trace Mica	8-14-23	18.5	37	
140.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-57 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 160.5 ±
Total Depth: 19.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/1/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
160.0	0.5	SURFICIAL ORGANIC SOILS	2-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: 3.5', Caved at 6.0' 24 Hrs: 2.0', Caved at 3.5'
		NATIVE SOILS: Loose, Brown, Moist to Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Roots (0-1.5')		1.5		
			4-3-3	3.5	6	
				5.0		
153.5	7.0	Very Loose, Brown, Saturated, Slightly Silty Poorly Graded SAND (SP)	2-1-1	8.5	2	
				10.0		
148.5	12.0	Very Hard, Gray, Wet, Fine Sandy Clayey SILT (ML)	11-20-32	13.5	52	
				15.0		
			12-32-50/2"	18.5	100+	
141.0	19.5	PARTIALLY WEATHERED ROCK: Sampled as Gray, Fine Sandy Clayey SILT		19.7		
140.8	19.7	Boring Terminated at 19.7 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-58 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 160 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/1/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		SURFICIAL ORGANIC SOILS	2-2-4	0.0		
159.3	0.7	NATIVE SOILS: Loose, Brown, Moist, Silty Fine SAND (SM)		1.5	6	GROUNDWATER DATA: 0 Hr: Dry, Caved at 17.0' 24 Hrs: 6.5', Caved at 7.0'
158.0	2.0	Stiff, Orange-Gray, Wet, Fine Sandy Silty CLAY (CH)	3-5-9	3.5	14	
				5.0		
153.0	7.0	Very Stiff to Very Hard, Gray, Wet, Fine Sandy Clayey SILT (ML)	3-5-14	8.5	19	
				10.0		
			16-23-34	13.5	57	
				15.0		
143.0	17.0	Dense, Gray, Wet, Silty Clayey Fine to Coarse SAND (SC)	15-20-20	18.5	40	
140.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-59 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 158.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/1/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
158.0	0.5	SURFICIAL ORGANIC SOILS	1-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: Dry inside Temporary Observation Well 24 Hrs: 0.0' inside Temporary Observation Well
		NATIVE SOILS: Loose, Brown, Moist, Silty Fine to Medium SAND (SM)		1.5		
156.5	2.0	Firm to Hard, Gray, Wet, Fine Sandy Clayey SILT (MH)	2-2-5	3.5	7	
				5.0		
			11-16-16	8.5	32	
				10.0		
146.5	12.0	Very Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)	12-24-35	13.5	59	
143.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-60 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 158 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/1/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
157.5	0.5	SURFICIAL ORGANIC SOILS	1-3-3	0.0	6	GROUNDWATER DATA: 0 Hr: 3.0', Caved at 13.0' 24 Hrs: 1.0', Caved at 2.0'
		NATIVE SOILS: Loose, Brown, Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
156.0	2.0	Loose, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	1-2-3	3.5	5	
				5.0		
151.0	7.0	Hard, Gray, Wet, Fine Sandy Silty CLAY (CH)	9-16-24	8.5	40	
				10.0		
			12-18-25	13.5	43	
143.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-61 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 156.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/27/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
156.3	0.2	SURFICIAL ORGANIC SOILS	1-2-4	0.0	6	GROUNDWATER DATA: 0 Hr: 7.0', Caved at 8.0' 24 Hrs: 0.0', Caved at 7.0'
		NATIVE SOILS: Loose, Black, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5		
154.5	2.0	Soft, Gray and Orange, Wet, Fine to Medium Sandy Silty CLAY (CL)	1-2-1	3.5	3	
				5.0		
149.5	▽ 7.0	Stiff to Very Stiff, Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Mica	6-7-11	8.5	18	
				10.0		
			4-6-10	13.5	16	
141.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-62 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 161.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
161.0	0.5	SURFICIAL ORGANIC SOILS	1-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: 3.0' inside Temporary Observation Well 24 Hrs: 1.5' inside Temporary Observation Well
		NATIVE SOILS: Loose, Dark Gray to Gray-Orange, Moist, Silty Clayey Fine to Medium SAND (SC)		1.5		
159.5	2.0	Loose, Gray, Saturated, Silty Fine SAND (SM)	3-3-4	3.5	7	
				5.0		
154.5	7.0	Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)	10-20-30	8.5	50	
				10.0		
149.5	12.0	Very Dense, Gray, Moist, Silty Clayey Fine to Medium SAND (SC)	11-21-31	13.5	52	
				15.0		
144.5	17.0	Medium Dense, Gray-Brown, Wet, Very Silty Fine SAND (SM)	17-15-9	18.5	24	
141.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-63 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 162 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
161.5	0.5	SURFICIAL ORGANIC SOILS	3-5-8	0.0	13	GROUNDWATER DATA: 0 Hr: 6.0' inside Temporary Observation Well 24 Hrs: 1.5' inside Temporary Observation Well
		NATIVE SOILS: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine to Coarse Gravel		1.5		
160.0	2.0	Loose, Gray-Brown, Wet, Clayey Silty Fine to Medium SAND (SM)	7-3-3	3.5	6	
				5.0		
155.0	7.0	Dense, Gray-Brown, Wet, Silty Clayey Fine SAND (SC)	8-12-19	8.5	31	
152.5	9.5	Dense, Gray-Brown, Wet, Very Silty Fine SAND (SM)		10.0		
150.0	12.0	Dense, Gray, Wet, Silty Clayey Fine SAND (SC)	6-13-32	13.5	45	
				15.0		
145.0	17.0	Very Dense, Gray, Wet, Very Silty Fine SAND (SM)	17-24-43	18.5	67	
142.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-64 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 123 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
122.5	0.5	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry, Caved at 4.9' Boring Backfilled Immediately After Drilling Completion
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine SAND (SM)		1.5		
121.0	2.0	Loose, Light Gray, Wet, Slightly Clayey Silty Fine to Medium SAND (SM)	3-2-3	3.5	5	
				5.0		
116.0	7.0	Medium Dense, Tan to Brown, Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	3-5-7	8.5	12	
				10.0		
			3-9-7	13.5	16	
108.0	15.0			15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-65 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 119 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
118.8	0.2	SURFICIAL ORGANIC SOILS	1-2-1	0.0	3	GROUNDWATER DATA: 0 Hr: 3.0', Caved at 5.2' 24 Hrs: 3.2', Caved at 6.4'
		NATIVE SOILS: Very Loose to Loose, Brown, Wet, Very Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
			6-7-9	3.5	16	
				5.0		
112.0	7.0	Very Loose, Brown and Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	1-1-1	8.5	2	
				10.0		
107.0	12.0	Soft, Brown and Gray, Wet, Fine to Medium Sandy Silty CLAY (CH)	3-1-3	13.5	4	
				15.0		
102.0	17.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CL)	4-10-26	18.5	36	
99.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-66 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 139 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
138.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry, Caved at 11.9' 24 Hrs: Dry, Caved at 11.4'
		NATIVE SOILS: Very Loose to Medium Dense, Brown, Moist, Very Silty Fine SAND (SM) with Trace Roots (0.0-1.5')		1.5		
			2-2-5	3.5	7	
				5.0		
			6-8-7	8.5	15	
				10.0		
127.0	12.0	Very Loose to Medium Dense, Brown, Wet to Saturated, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	3-2-2	13.5	4	
				15.0		
		Saturated from 18.5'-20.0'	4-3-9	18.5	12	
119.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-67 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 146.5 ±
Total Depth: 10.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/13/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
146.1	0.4	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry, Caved at 6.2' 24 Hrs: Dry, Caved at 6.5'
		NATIVE SOILS: Very Loose to Loose, Brown, Moist, Very Silty Fine SAND (SM) with Trace Roots (0.0-1.5')		1.5		
			2-3-3	3.5	6	
				5.0		
139.5	7.0	Loose, Brown, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Fine Gravel				
			3-3-3	8.5	6	
136.5	10.0	Boring Terminated at 10 feet.		10.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-68 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 156 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/18/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
155.5	0.5	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry, Caved at 6.5' 24 Hrs: 3.5', Caved at 7.0'
		NATIVE SOILS: Very Loose, Tan, Moist, Very Silty Fine SAND (SM)		1.5		
154.0	2.0	Loose, Brown, Wet, Silty Clayey Fine to Medium SAND (SC)	2-4-5	3.5	9	
				5.0		
149.0	7.0	Firm to Stiff, Dark Gray, Wet, Fine Sandy Silty CLAY (CH) with Trace Mica	1-3-5	8.5	8	
				10.0		
			4-6-8	13.5	14	
141.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-69 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 167 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/19/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Loose, Tan, Moist, Silty Fine to Medium SAND (SM)	3-4-6	0.0		
					10	GROUNDWATER DATA: 0 Hr: 7.0', Caved at 9.0' 24 Hrs: 6.7', Caved at 9.5'
				1.5		
165.0	2.0	Medium Dense, Brown, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Fine Gravel				
			5-8-8	3.5		
					16	
				5.0		
160.0	7.0	Loose, Brown, Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel				
			4-4-5	8.5		
					9	
				10.0		
155.0	12.0	Very Loose, Brown, Saturated, Poorly Graded SAND (SP) with Trace Silt and Fine Gravel				
			1-1-2	13.5		
					3	
				15.0		
			WOH-1-2	18.5		
					3	
				20.0		
145.0	22.0	Medium Dense, Gray and Brown, Wet, Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel				
			4-4-8	23.5		
					12	
142.0	25.0	Boring Terminated at 25 feet.		25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

BORING_LOG 66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-70 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 150 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/19/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
149.4	0.6	SURFICIAL ORGANIC SOILS	2-3-4	0.0	7	GROUNDWATER DATA: 0 Hr: 1.1', Caved at 5.6' 24 Hrs: 1.3', Caved at 3.8'
		NATIVE SOILS: Loose to Dense, Gray to Red, Wet, Very Silty Fine SAND (SM)		1.5		
			9-17-17	3.5	34	
				5.0		
143.0	7.0	Medium Dense, Brown, Wet, Silty Clayey Fine to Medium SAND (SC)	6-6-12	8.5	18	
				10.0		
138.0	12.0	Hard, Gray, Wet, Fine Sandy Silty CLAY (CL)	7-14-24	13.5	38	
135.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-71 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 164 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/19/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
163.6	0.4	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: 7.5', Caved at 10.54' 24 Hrs: 8.0', Caved at 8.8'
		NATIVE SOILS: Very Loose, Brown, Moist, Very Silty Fine SAND (SM)		1.5		
			2-2-2	3.5	4	
				5.0		
157.0	7.0	Medium Dense, Brown, Wet, Fine Silty Clayey SAND (SC)	5-9-5	8.5	14	
				10.0		
152.0	12.0	Loose, Brown, Saturated, Very Silty Fine SAND (SM) with Trace Fine Gravel	5-5-5	13.5	10	
149.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-72 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 142.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/20/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
142.3	0.2	SURFICIAL ORGANIC SOILS	3-4-4	0.0	8	GROUNDWATER DATA: 0 Hr: 8.9', Caved at 13.1' 24 Hrs: 7.4', Caved at 12.9'
		NATIVE SOILS: Loose, Dark Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots		1.5		
140.5	2.0	Stiff, Dark Gray, Wet, Fine Sandy Silty CLAY (CH)	5-6-7	3.5	13	
				5.0		
135.5	7.0 ▼	Stiff, Dark Gray, Wet, Fine Sandy Clayey SILT (ML) with Trace Mica	4-5-9	8.5	14	
	▽			10.0		
130.5	12.0	Medium Dense to Dense, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	6-10-12	13.5	22	
				15.0		
			7-16-22	18.5	38	
122.5	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-73 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 144 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/19/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Loose, Dark Brown to Gray, Moist to Wet, Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	4-4-5	0.0	9	GROUNDWATER DATA: 0 Hr: 7.1', Caved at 11.5' 24 Hrs: 6.4', Caved at 8.4'
				1.5		
		Wet from 3.5'-7'	2-3-3	3.5	6	
				5.0		
137.0	▽ 7.0	Medium Dense to Dense, Brown, Saturated, Very Silty Fine SAND (SM) with Trace Fine Gravel	2-15-11	8.5	26	
				10.0		
			15-18-26	13.5	44	
129.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-74 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 147 ±
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/24/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
146.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: 7.9', Caved at 10.3' 24 Hrs: 9.7' inside Temporary Observation Well
		NATIVE SOILS: Very Loose, Brown, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		
145.0	2.0	Loose, Gray and Brown, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Roots	2-4-6	3.5	10	
				5.0		
140.0	7.0 ▼	Medium Dense to Dense, White, Saturated, Very Silty Fine to Medium SAND (SM) with Trace Fine Gravel	3-3-10	8.5	13	
				10.0		
			18-17-21	13.5	38	
				15.0		
128.5	18.5		50/5"	18.5		
128.1	18.9	PARTIALLY WEATHERED ROCK: Sampled as Brown and Gray, Silty Clayey Fine to Medium SAND		18.9	100+	
		Boring Terminated at 18.9 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-75 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 148 ±
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/24/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose, Black, Moist, Silty Fine SAND (SM) with Trace Roots	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: 4.5', Caved at 5.0' 24 Hrs: 3.0', Caved at 4.0'
				1.5		
146.0	2.0	Loose to Dense, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)				
			3-2-3	3.5	5	
				5.0		
			9-15-17	8.5	32	
				10.0		
136.0	12.0	Stiff, Gray, Wet, Fine Sandy CLAY (CH)				
			6-5-4	13.5	9	
				15.0		
129.5	18.5		50/5"	18.5		
129.1	18.9	PARTIALLY WEATHERED ROCK: Sampled as Gray, Fine Sandy Clayey SILT		18.9	100+	
		Boring Terminated at 18.9 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-77 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 173 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
172.6	0.4	SURFICIAL ORGANIC SOILS	4-7-6	0.0	13	GROUNDWATER DATA: 0 Hr: 18.9' inside Temporary Observation Well 24 Hrs: 9.5' inside Temporary Observation Well
		POSSIBLE FILL: Medium Dense, Brown, Moist, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Roots		1.5		
171.0	2.0	NATIVE SOILS: Loose, Tan, Moist to Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	5-4-4	3.5	8	
				5.0		
		Wet from 8.5'-12.0'	2-4-2	8.5	6	
				10.0		
161.0	12.0	Loose, Orange-Brown, Wet, Silty Clayey Fine SAND (SC)	3-3-2	13.5	5	
				15.0		
156.0	17.0	Very Stiff to Hard, Gray, Wet, Fine Sandy CLAY (CH)	7-14-22	18.5	36	
				20.0		
			6-9-14	23.5	23	
148.5	24.5					
148.0	25.0	Medium Dense, Brown, Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		25.0		
		Boring Terminated at 25 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

BORING_LOG 66W-0027 BORING LOGS.GPJ F&R.GDT 8/2/19

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-78 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 174 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
173.7	0.3	SURFICIAL ORGANIC SOILS	1-2-3	0.0	5	GROUNDWATER DATA:
		NATIVE SOILS: Loose, Tan, Moist, Very Silty Fine SAND (SM) with Trace Roots		1.5		0 Hr: 9.5' inside Temporary Observation Well
172.0	2.0	Medium Dense, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM)	3-6-8	3.5	14	24 Hrs: 7.0' inside Temporary Observation Well
				5.0		
167.0	7.0	Very Loose, Tan to Light Gray, Saturated, Poorly Graded SAND (SP) with Trace Silt	4-3-1	8.5	4	
				10.0		
			1-WOH-WOH	13.5	0	
				15.0		
			1-1-1	18.5	2	
				20.0		
152.0	22.0	Very Stiff, Dark Gray, Wet, Fine Sandy Clayey SILT (ML) with Trace Mica and Coarse Rock Fragments	5-10-13	23.5	23	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-78 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 174 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
147.0	27.0	Medium Dense, Brown, Wet, Silty Fine to Medium SAND (SM)	6-9-15	28.5	24	
144.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-79 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 177 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
176.8	0.2	SURFICIAL ORGANIC SOILS	8-9-8	0.0	17	GROUNDWATER DATA:
		POSSIBLE FILL: Medium Dense, Brown, Moist, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5		0 Hr: 9.5' inside Temporary Observation Well
175.0	2.0	NATIVE SOILS: Very Loose to Loose, Brown, Wet to Saturated, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	2-1-2	3.5	3	24 Hrs: 9.7' inside Temporary Observation Well
				5.0		
			3-3-3	8.5	6	
				10.0		
		Saturated from 13.5'-17'	2-1-2	13.5	3	
				15.0		
160.0	17.0	Very Loose to Loose, Brown, Saturated, Slightly Clayey Very Silty Fine to Medium SAND (SM) with Trace Fine Gravel	1-2-3	18.5	5	
				20.0		
			2-1-2	23.5	3	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-79 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 177 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/25/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
150.0	27.0	Very Loose, Brown, Saturated, Poorly Graded SAND (SP) with Trace Silt	1-1-1	28.5	2	
147.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-80 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 120 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/4/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Loose to Medium Dense, Dark Brown, Moist to Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	3-6-4	0.0	10	GROUNDWATER DATA: 0 Hr: 4.3', Caved at 4.6' 24 Hrs: 0.1', Caved at 0.4'
				1.5		
		Wet from 3.5'-5.0'	3-7-7	3.5	14	
				5.0		
113.0	7.0	Medium Dense to Dense, Light Gray, Saturated, Fine SAND (SP) with Trace Silt and Fine Gravel	18-16-20	8.5	36	
				10.0		
			5-11-12	13.5	23	
105.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-81 (1 of 1)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 126 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/4/19
Driller: F&R Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
125.7	0.3	SURFICIAL ORGANIC SOILS	1-3-5	0.0	8	GROUNDWATER DATA: 0 Hr: 13.3', Caved at 13.5' 24 Hrs: 10.7', Caved at 12.0'
		NATIVE SOILS: Loose to Medium Dense, Brown, Moist, Slightly Clayey Very Silty Fine SAND (SM)		1.5		
			7-8-9	3.5	17	
				5.0		
119.0	7.0	Loose, Brown, Wet, Clayey Silty Fine to Coarse SAND (SM) with Trace Fine Gravel	4-4-5	8.5	9	
				10.0		
		Noted Wood Fragments at 13.5'-15.0'	2-2-3	13.5	5	
				15.0		
			4-4-4	18.5	8	
106.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

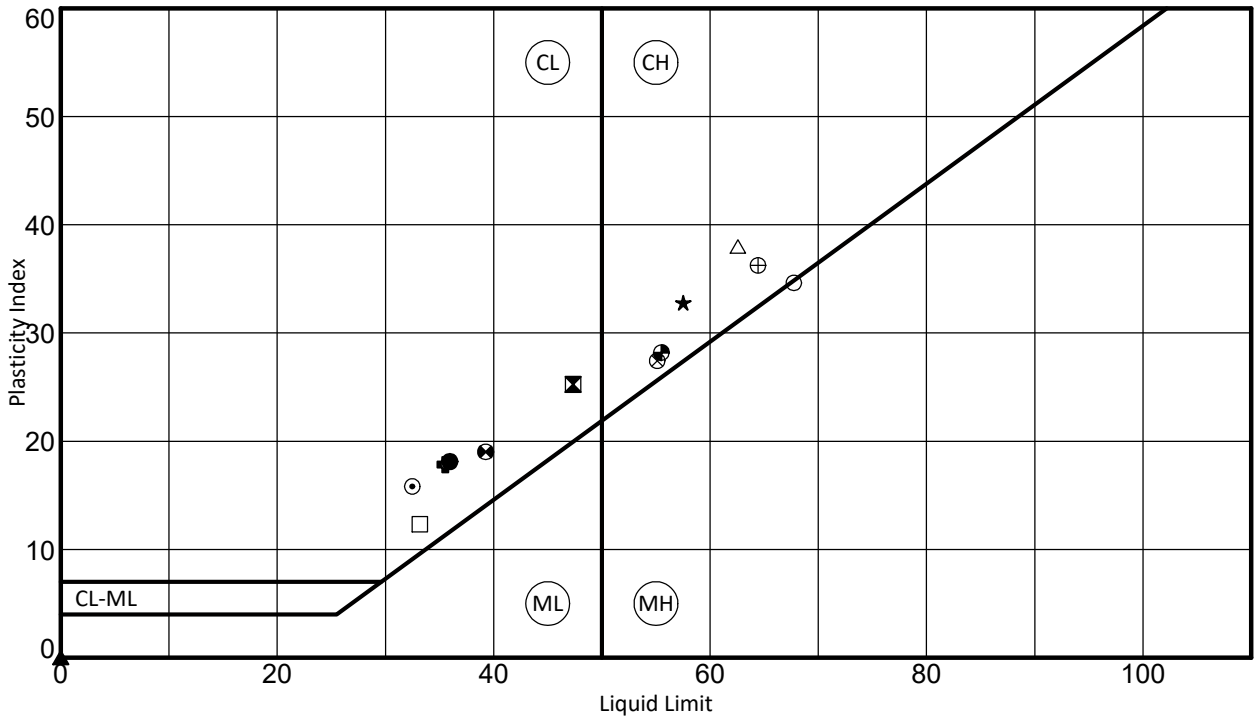
LABORATORY TEST RESULTS

FROEHLING & ROBERTSON
Engineering Stability Since 1881

ATTERBERG LIMITS

Sheet: 1 of 1

Project No: 66W-0027
Client: WK Dickson
Project: FAYPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC



Boring No.	Depth	LL	PL	PI	Fines	Classification	% Natural Water Content
● B-2	8.5' - 10.0	36	18	18	46.9	CLAYEY SAND (SC)	17.9
⊠ B-6	13.5' - 15.0'	47	22	25	54.9	SANDY LEAN CLAY (CL)	17.1
▲ B-6	3.5' - 5.0'	NP	NP	NP	31.4	SILTY SAND (SM)	19.1
★ B-13	8.5' - 10.0'	58	25	33	94.6	FAT CLAY (CH)	20.6
⊙ B-22	8.5' - 10.0'	32	17	15	53.6	SANDY LEAN CLAY (CL)	15.9
✿ B-36	8.5' - 10.0'	36	18	18	71.2	LEAN CLAY with SAND (CL)	10.9
○ B-37	8.5' - 10.0'	68	33	35	85.8	ELASTIC SILT (MH)	29.1
△ B-45	3.5' - 5.0'	63	25	38		()	24.1
⊗ B-58	3.5' - 5.0'	55	28	27	80.7	FAT CLAY with SAND (CH)	23.9
⊕ B-60	8.5' - 10.0'	64	28	36	84.9	FAT CLAY with SAND (CH)	19.1
□ B-61	3.5' - 5.0'	33	21	12	70.6	LEAN CLAY with SAND (CL)	27.1
⊠ B-71	8.5' - 10.0'	39	20	19	37.3	CLAYEY SAND (SC)	22.4
◕ B-72	3.5' - 5.0'	55	27	28	94.9	FAT CLAY (CH)	31.7

Froehling & Robertson, Inc. (Raleigh)
Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Lab Submittal Date: 05/02/2019
Prism Work Order: 9050081

This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

Narrative Notes:

ORP analysis was subcontracted to Gulf Coast Analytical Labs. Laboratory report is attached.

Sulfide and resistivity subcontracted Analytical Environmental Services. Laboratory report is attached.

Please call if you have any questions relating to this analytical report.

Respectfully,

PRISM LABORATORIES, INC.

Angela D. Overcash

VP Laboratory Services

Reviewed By Terri W. Cole For Angela D. Overcash

Project Manager

Data Qualifiers Key Reference:

HT	Sample received and analyzed outside of the hold time.
BRL	Below Reporting Limit
MDL	Method Detection Limit
RPD	Relative Percent Difference
*	Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

Sample Receipt Summary

05/15/2019

Prism Work Order: 9050081

Client Sample ID	Lab Sample ID	Matrix	Date/Time Sampled	Date/Time Received
B-21 Composite	9050081-01	Solid	04/10/19 0:00	05/02/19 12:35
B-22 Composite	9050081-02	Solid	04/10/19 0:00	05/02/19 12:35
B-25 Composite	9050081-03	Solid	04/10/19 0:00	05/02/19 12:35
B-27 Composite	9050081-04	Solid	04/10/19 0:00	05/02/19 12:35
B-30 Composite	9050081-05	Solid	04/10/19 0:00	05/02/19 12:35
B-31 Composite	9050081-06	Solid	04/10/19 0:00	05/02/19 12:35
B-36 Composite	9050081-07	Solid	04/10/19 0:00	05/02/19 12:35
B-37 Composite	9050081-08	Solid	04/10/19 0:00	05/02/19 12:35
B-39 Composite	9050081-09	Solid	04/10/19 0:00	05/02/19 12:35
B-59 Composite	9050081-10	Solid	04/10/19 0:00	05/02/19 12:35
B-62/B-63 Composite	9050081-11	Solid	04/10/19 0:00	05/02/19 12:35

Samples were received at 22.6 degrees C. See case narrative for further information.

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-21 Composite
Prism Sample ID: 9050081-01
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	44	13	1	*9056A	5/8/19 16:43	BMS	P9E0136
Sulfate	BRL	mg/kg dry	260	77	1	*9056A	5/8/19 16:43	BMS	P9E0136
General Chemistry Parameters									
% Solids	**56.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.2**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**43.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-22 Composite
Prism Sample ID: 9050081-02
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	**29**	**mg/kg dry**	**29**	**8.5**	**1**	***9056A**	**5/8/19 17:32**	**BMS**	**P9E0136**
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	5/8/19 17:32	BMS	P9E0136
General Chemistry Parameters									
% Solids	**85.0 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**5.0**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**15.0 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-25 Composite
Prism Sample ID: 9050081-03
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	31	9.0	1	*9056A	5/8/19 17:48	BMS	P9E0136
Sulfate	BRL	mg/kg dry	190	55	1	*9056A	5/8/19 17:48	BMS	P9E0136
General Chemistry Parameters									
% Solids	**80.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.7**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**19.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

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Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-27 Composite
Prism Sample ID: 9050081-04
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.3	1	*9056A	5/8/19 18:04	BMS	P9E0136
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	5/8/19 18:04	BMS	P9E0136
General Chemistry Parameters									
% Solids	**87.2 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**5.5**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**12.8 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-30 Composite
Prism Sample ID: 9050081-05
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	5/8/19 18:53	BMS	P9E0136
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	5/8/19 18:53	BMS	P9E0136
General Chemistry Parameters									
% Solids	**84.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.4**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**15.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

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Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-31 Composite
Prism Sample ID: 9050081-06
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.5	1	*9056A	5/8/19 19:09	BMS	P9E0136
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	5/8/19 19:09	BMS	P9E0136
General Chemistry Parameters									
% Solids	**84.4 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.4**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**15.6 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-36 Composite
Prism Sample ID: 9050081-07
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.7	1	*9056A	5/8/19 19:26	BMS	P9E0136
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	5/8/19 19:26	BMS	P9E0136
General Chemistry Parameters									
% Solids	**83.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.7**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**16.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-37 Composite
Prism Sample ID: 9050081-08
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	36	11	1	*9056A	5/8/19 19:42	BMS	P9E0136
Sulfate	**12000**	**mg/kg dry**	**2200**	**640**	**10**	***9056A**	**5/9/19 17:04**	**BMS**	**P9E0136**
General Chemistry Parameters									
% Solids	**68.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**2.7**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**31.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-39 Composite
Prism Sample ID: 9050081-09
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	28	8.0	1	*9056A	5/8/19 19:58	BMS	P9E0136
Sulfate	BRL	mg/kg dry	170	48	1	*9056A	5/8/19 19:58	BMS	P9E0136
General Chemistry Parameters									
% Solids	**90.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.9**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**9.27 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-59 Composite
Prism Sample ID: 9050081-10
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	5/8/19 20:15	BMS	P9E0136
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	5/8/19 20:15	BMS	P9E0136
General Chemistry Parameters									
% Solids	**84.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.2**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**15.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-62/B-63 Composite
Prism Sample ID: 9050081-11
Prism Work Order: 9050081
Time Collected: 04/10/19 00:00
Time Submitted: 05/02/19 12:35

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	28	8.2	1	*9056A	5/8/19 21:04	BMS	P9E0137
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	5/8/19 21:04	BMS	P9E0137
General Chemistry Parameters									
% Solids	**87.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**
pH	**4.2**	**pH Units**			**1**	***9045D**	**5/6/19 16:16**	**CBM**	**P9E0103**
% Moisture	**12.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**5/6/19 13:30**	**MMR**	**P9E0090**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9050081
Time Submitted: 5/2/2019 12:35:00PM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9E0136 - Default Prep GenChem										
Blank (P9E0136-BLK1)				Prepared & Analyzed: 05/08/19						
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9E0136-BS1)				Prepared & Analyzed: 05/08/19						
Chloride	1020	25	mg/kg wet	1000		102	80-120			
Sulfate	1000	150	mg/kg wet	1000		100	80-120			
Matrix Spike (P9E0136-MS1)		**Source: 9050081-01**		Prepared & Analyzed: 05/08/19						
Chloride	1850	44	mg/kg dry	1757	17.9	104	80-120			
Sulfate	1960	260	mg/kg dry	1757	92.5	106	80-120			
Matrix Spike Dup (P9E0136-MSD1)		**Source: 9050081-01**		Prepared & Analyzed: 05/08/19						
Chloride	1870	44	mg/kg dry	1757	17.9	105	80-120	0.9	15	
Sulfate	2000	260	mg/kg dry	1757	92.5	108	80-120	2	15	
Batch P9E0137 - Default Prep GenChem										
Blank (P9E0137-BLK1)				Prepared & Analyzed: 05/08/19						
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9E0137-BS1)				Prepared & Analyzed: 05/08/19						
Chloride	1010	25	mg/kg wet	1000		101	80-120			
Sulfate	996	150	mg/kg wet	1000		100	80-120			
Matrix Spike (P9E0137-MS1)		**Source: 9050081-11**		Prepared & Analyzed: 05/08/19						
Chloride	1220	28	mg/kg dry	1138	12.5	106	80-120			
Sulfate	1450	170	mg/kg dry	1138	116	117	80-120			

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9050081
Time Submitted: 5/2/2019 12:35:00PM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9E0137 - Default Prep GenChem										
Matrix Spike Dup (P9E0137-MSD1)		**Source: 9050081-11**		Prepared & Analyzed: 05/08/19						
Chloride	1220	28	mg/kg dry	1138	12.5	106	80-120	0.2	15	
Sulfate	1390	170	mg/kg dry	1138	116	112	80-120	4	15	

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9050081
Time Submitted: 5/2/2019 12:35:00PM

General Chemistry Parameters - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9E0103 - NO PREP										
LCS (P9E0103-BS1)				Prepared & Analyzed: 05/06/19						
pH	6.85		pH Units	6.880		99.6	98.5-101.5			
Duplicate (P9E0103-DUP1)		**Source: 9050081-01**		Prepared & Analyzed: 05/06/19						
pH	4.17		pH Units		4.17			0.00	20	

Sample Extraction Data

Prep Method: Default Prep GenChem

Lab Number	Batch	Initial	Final	Date/Time
9050081-01	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-02	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-03	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-04	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-05	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-06	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-07	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-08	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-08	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-09	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-10	P9E0136	5 g	50 mL	05/08/19 9:45
9050081-11	P9E0137	5 g	50 mL	05/08/19 9:45

Prep Method: Solids, Dry Weight

Lab Number	Batch	Initial	Final	Date/Time
9050081-01	P9E0090	30 g	30 g	05/06/19 13:30
9050081-02	P9E0090	30 g	30 g	05/06/19 13:30
9050081-03	P9E0090	30 g	30 g	05/06/19 13:30
9050081-04	P9E0090	30 g	30 g	05/06/19 13:30
9050081-05	P9E0090	30 g	30 g	05/06/19 13:30
9050081-06	P9E0090	30 g	30 g	05/06/19 13:30
9050081-07	P9E0090	30 g	30 g	05/06/19 13:30
9050081-08	P9E0090	30 g	30 g	05/06/19 13:30
9050081-09	P9E0090	30 g	30 g	05/06/19 13:30
9050081-10	P9E0090	30 g	30 g	05/06/19 13:30
9050081-11	P9E0090	30 g	30 g	05/06/19 13:30

Subcontracted Analyses

The following analyses were subcontracted to Analytical Environmental Services, Inc.

Lab Number	Analysis
9050081-01	Resistivity (Sub)
9050081-01	Sulfide (Sub)
9050081-02	Resistivity (Sub)
9050081-02	Sulfide (Sub)
9050081-03	Resistivity (Sub)
9050081-03	Sulfide (Sub)
9050081-04	Resistivity (Sub)
9050081-04	Sulfide (Sub)
9050081-05	Resistivity (Sub)
9050081-05	Sulfide (Sub)
9050081-06	Resistivity (Sub)
9050081-06	Sulfide (Sub)
9050081-07	Resistivity (Sub)
9050081-07	Sulfide (Sub)
9050081-08	Resistivity (Sub)
9050081-08	Sulfide (Sub)
9050081-09	Resistivity (Sub)
9050081-09	Sulfide (Sub)
9050081-10	Resistivity (Sub)
9050081-10	Sulfide (Sub)
9050081-11	Resistivity (Sub)
9050081-11	Sulfide (Sub)

The following analyses were subcontracted to Gulf Coast Analytical Labs, Inc.

Lab Number	Analysis
9050081-01	ORP (Sub)
9050081-02	ORP (Sub)
9050081-03	ORP (Sub)
9050081-04	ORP (Sub)
9050081-05	ORP (Sub)
9050081-06	ORP (Sub)
9050081-07	ORP (Sub)
9050081-08	ORP (Sub)
9050081-09	ORP (Sub)
9050081-10	ORP (Sub)
9050081-11	ORP (Sub)

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions
449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: _____

Project Name: FAYPWC BIG ROCKFISH CREEK OUTFALL
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT ~~AVE~~ STREET

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310 HUBERT STREET, RALEIGH, NC, 27603
Phone: 919-719-1845 Fax (Yes) (No): _____
Email (Yes) (No) Email Address MKAYSER@FandR.com
EDD Type: ___ PDF ✓ Excel ___ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: Various

Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?			
Received ON WET ICE? Temp			
PROPER PRESERVATIVES indicated?			
Received WITHIN HOLDING TIMES?			
CUSTODY SEALS INTACT?			
VOLATILES rec'd W/OUT HEADSPACE?			
PROPER CONTAINERS used?			

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL
Certification: NELAC ___ USACE ___ FL ___ NC ___
SC ___ OTHER ___ N/A ___
Water Chlorinated: YES ___ NO ___
Sample Iced Upon Collection: YES ___ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	pH	Chloride	Sulfate	Electrical Resistivity	Red ox	Sulfides	REMARKS	PRISM LAB ID NO.
B-21 (8.5-10) (13.5-15)	4/10/19		SOIL	G	S-3 S-4										B-21 Comp 01	01 ~~02~~
B-22 (13.5-15 18.5-20)			SOIL	G	S-4 S-5										B-22 Comp 02	~~03~~ ~~04~~
B-25 (8.5-10) (13.5-15) (18.5-20)					S-3B S-4 S-5										B-25 Comp 03	~~05~~ 06 ~~07~~
B-27 (8.5-10) (13.5-15)					S-3 S-4										B-27 Comp 04	~~05~~ ~~09~~
B-30 (8.5-10) (13.5-15)					S-3 S-4										B-30 Comp 05	~~10~~ ~~11~~
B-31 (14.5'-15') (18.5'-20')					S-4A S-5										B-31 Comp 06	~~12~~ ~~13~~
B-36 (13.5'-15' (18.5'-20')					S-4 S-5										B-36 Comp 07	~~14~~ ~~15~~
B-37 (14.5'-15') (18.5'-19.5')					S-4 S-4A										B-37 Comp 08	~~16~~ ~~17~~
B-39 (3.5'-5') (8.5'-10')					S-2 S-3										B-39 Comp 09	~~18~~ ~~19~~
B-59 (3.5'-5') (8.5'-10')					S-2 S-3										B-59 Comp 10	~~20~~ ~~21~~

PRESS DOWN FIRMLY - 3 COPIES

Sampler's Signature F.A. KAYSER Sampled By (Print Name) MOHAMMAD KAYSER Affiliation _____

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	05/01/19	13:46
Relinquished By: (Signature)	Received By: (Signature)	Date	
Relinquished By: (Signature)	Received For Prism Laboratories By:	Date 05/02/19	12:35

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.
☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other Courier Express
Log-In Group No. 905008 1

Additional Comments:

PRISM USE ONLY
Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

PRISM LABORATORIES, INC.
Full Service Analytical & Environmental Solutions
449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: _____

Project Name: FAYPWC BIG ROCKFISH CREEK OUTFALL
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT ~~ABI~~ STREET

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310 HUBERT STREET, RALEIGH, NC, 27603
Phone: 919-719-1845 Fax (Yes) (No): _____
Email (Yes) (No) Email Address MKAYSER@FandR.com
EDD Type: ___ PDF ✓ Excel ___ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: Various

Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?			
Received ON WET ICE? Temp 3.2 4.3			
PROPER PRESERVATIVES indicated?			
Received WITHIN HOLDING TIMES?			
CUSTODY SEALS INTACT?			
VOLATILES rec'd W/OUT HEADSPACE?			
PROPER CONTAINERS used?			

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL
Certification: NELAC ___ USACE ___ FL ___ NC ___
SC ___ OTHER ___ N/A ___
Water Chlorinated: YES ___ NO ___
Sample Iced Upon Collection: YES ___ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	PH	Chloride	Sulfate	Electrical Resistivity	Red Ox	Sulfides	REMARKS	PRISM LAB ID NO.
B-62 (13.5'-15')			SOIL	G		S-4		✓	✓	✓	✓	✓	✓	✓	Comp. 11 B-62/B-63	~~62~~ 63
B-63 (13.5'-15')			SOIL	G		S-4										

PRESS DOWN FIRMLY - 3 COPIES

Sampler's Signature F.A. KAYSER Sampled By (Print Name) MOHAMMAD KAYSER Affiliation _____

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature) Philip Paige	05/01/19	13:46
Relinquished By: (Signature) Philip Paige	Received By: (Signature)	Date	
Relinquished By: (Signature)	Received For Prism Laboratories By:	Date 5/2/19	0835

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.
☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other _____
Log-In Group No. 9050081

Additional Comments:

PRISM USE ONLY
Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT

Prism Laboratories
PO Box 240543
Charlotte NC 282240543

ATTENTION
Terri W. Cole

PROJECT ID
9050081

LABORATORY REPORT NUMBER
1905511

DATE
May 14, 2019

Primary Data Review By

Chris Pafford
Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.**
- **AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582**
- **AIHA-LAP,LLC Laboratory ID:100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.**
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll fee at 883.315.4243

1905511

Sub to AES 5/6 - Fed Ex Std
No Ice

PRISM LABORATORIES, INC | Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9050081

Certification: NELAC___ USACE___
NC ✓ SC___ Other _____
N/A___

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Analytical Environmental Services, Inc.
3080 Presidential Parkway
Atlanta, GA 30340
Phone :(770) 457-8177
Fax: NA

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9050081-01	**Solid**	**Sampled: 04/10/19 00:00**	B-21 Comp	
Sulfide (Sub)		04/17/19 00:00		
Resistivity (Sub)		05/08/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9050081-02	**Solid**	**Sampled: 04/10/19 00:00**	B-22 Comp	
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
Sample ID: 9050081-03	**Solid**	**Sampled: 04/10/19 00:00**	B-25 Comp	
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
Sample ID: 9050081-04	**Solid**	**Sampled: 04/10/19 00:00**	B-27 Comp	
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied				
~~**Sample ID: 9050081-05**~~	~~**Solid**~~	~~**Sampled: 04/10/19 00:00**~~	~~B-30 Comp~~	See page 2
Sulfide (Sub)		04/17/19 00:00		

Relinquished By FedEX	Date 5-6-19	Received By Fed Ex	Date
Released By	Date	Received By AES	Date 5-7-19 9 30
Released By	Date	Received By	Date
Released By	Date	Received By	Date

Page 1 of 2

1905511

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9050081

Certification: NELAC___ USACE___
NC___ SC___ Other_____
N/A___

Analysis	Due	Expires	Laboratory ID	Comments
			B-30 Comp	
Sample ID: 9050081-05	**Solid**	**Sampled: 04/10/19 00:00**		
Resistivity (Sub)		05/08/19 00:00		
Containers Supplied: 1x 4oz jar				
			B-31 Comp	
Sample ID: 9050081-06	**Solid**	**Sampled: 04/10/19 00:00**		
Sulfide (Sub)		04/17/19 00:00		
Resistivity (Sub)		05/08/19 00:00		
Containers Supplied:				
			36 Bag	
			B-37 Comp	
Sample ID: 9050081-07	**Solid**	**Sampled: 04/10/19 00:00**		
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
			B-39 Comp	
Sample ID: 9050081-08	**Solid**	**Sampled: 04/10/19 00:00**		
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
			B-39 Comp	
Sample ID: 9050081-09	**Solid**	**Sampled: 04/10/19 00:00**		
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
			B-59 Comp	
Sample ID: 9050081-10	**Solid**	**Sampled: 04/10/19 00:00**		
Resistivity (Sub)		05/08/19 00:00		
Sulfide (Sub)		04/17/19 00:00		
Containers Supplied:				
			B-62 | B-63 Comp	
Sample ID: 9050081-11	**Solid**	**Sampled: 04/10/19 00:00**		
Sulfide (Sub)		04/17/19 00:00		
Resistivity (Sub)		05/08/19 00:00		
Containers Supplied				

Released By	Date	Received By	Date
Jalon Y	5.6.19	Fed Ex	
Fed Ex		Imeon Peters ACS	5-7-19 9:30

Page 2 of 2

Analytical Environmental Services, Inc

Date: 14-May-19

Client: Prism Laboratories
Project: 9050081
Lab ID: 1905511

Case Narrative

Sample Receiving Nonconformance:

1905511 was received at 18°C, outside required temperature range of 0-6°C. No ice was present. The laboratory proceeded with analysis at the request of Angela Martin via email 05-07-19.

Samples for Sulfide analysis by EPA SW-846 9034 were received outside method specified holding time of 7 days. The laboratory proceeded with analysis per client project history.

Analytical Environmental Services, Inc

Date: 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-21 COMP
Lab Order	1905511	**Tag Number:**	9050081-01
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-001A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	63.6	75.7	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	14900		0	0	ohms*cm	279011	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	47.1		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-22 COMP
Lab Order	1905511	**Tag Number:**	9050081-02
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-002A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	37.2	44.2	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	20400		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	9.60		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-25 COMP
Lab Order	1905511	**Tag Number:**	9050081-03
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-003A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	49.2	58.6	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	10100		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	31.8		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-27 COMP
Lab Order	1905511	**Tag Number:**	9050081-04
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-004A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	39.5	47.0	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	22600		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	15.0		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-30 COMP
Lab Order	1905511	**Tag Number:**	9050081-05
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-005A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	39.8	47.4	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	19500		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	15.6		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-31 COMP
Lab Order	1905511	**Tag Number:**	9050081-06
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-006A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	39.5	47.1	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	9780		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	15.0		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-36 COMP
Lab Order	1905511	**Tag Number:**	9050081-07
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-007A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	38.6	46.0	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	18500		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	13.0		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-37 COMP
Lab Order	1905511	**Tag Number:**	9050081-08
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-008A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	45.8	54.5	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	446		0	0	ohms*cm	279011	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	26.6		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-39 COMP
Lab Order	1905511	**Tag Number:**	9050081-09
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-009A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	642	H	37.0	44.1	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	6110		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	9.30		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-59 COMP
Lab Order	1905511	**Tag Number:**	9050081-10
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-010A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	40.1	47.7	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	17000		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	16.2		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 14-May-19

Client:	Prism Laboratories	**Client Sample ID:**	B-62/B-63 COMP
Lab Order	1905511	**Tag Number:**	9050081-11
Project Name:	9050081	**Collection Date:**	4/10/2019 12:01:00 AM
Lab ID:	1905511-011A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	66.7	H	38.1	45.3	mg/Kg-dry	278916	1	05/09/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	16500		0	0	ohms*cm	278891	1	05/13/2019 16:30	AT
PERCENT MOISTURE D2216									
Percent Moisture	11.8		0	0	wt%	R397842	1	05/10/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Clear Save as

ANALYTICAL ENVIRONMENTAL AES SERVICES, INC.

SAMPLE/COOLER RECEIPT CHECKLIST

1. Client Name: Access Analytical, Inc. AES Work Order Number: 1905511

2. Carrier: FedEx ■ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other _____

		Yes	No	N/A	Details	Comments
3.	Shipping container/cooler received in good condition?	●	○	○	damaged ☐ leaking ☐ other ☐	
4.	Custody seals present on shipping container?	○	●	○		
5.	Custody seals intact on shipping container?	○	○	●		
6.	Temperature blanks present?	○	●	○		
7.	Cooler temperature(s) within limits of 0-6°C? [See item 13 and 14 for temperature recordings.]	○	●	○	Cooling initiated for recently collected samples / ice present ☐	
8.	Chain of Custody (COC) present?	●	○	○		
9.	Chain of Custody signed, dated, and timed when relinquished and received?	●	○	○		
10.	Sampler name and/or signature on COC?	●	○	○		
11.	Were all samples received within holding time?	○	●	○		
12.	TAT marked on the COC?	●	○	○	If no TAT indicated, proceeded with standard TAT per Terms & Conditions. ☐	

13. Cooler 1 Temperature 18.0 °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C

14. Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

15. Comments: _____

I certify that I have completed sections 1-15 (dated initials). AP 5/7/19

		Yes	No	N/A	Details	Comments
16.	Were sample containers intact upon receipt?	●	○	○		
17.	Custody seals present on sample containers?	○	●	○		
18.	Custody seals intact on sample containers?	○	○	●		
19.	Do sample container labels match the COC?	●	○	○	incomplete info ☐ illegible ☐ no label ☐ other ☐	
20.	Are analyses requested indicated on the COC?	●	○	○		
21.	Were all of the samples listed on the COC received?	●	○	○	samples received but not listed on COC ☐ samples listed on COC not received ☐	
22.	Was the sample collection date/time noted?	●	○	○		
23.	Did we receive sufficient sample volume for indicated analyses?	●	○	○		
24.	Were samples received in appropriate containers?	●	○	○		
25.	Were VOA samples received without headspace (< 1/4" bubble)?	○	○	●		
26.	Were trip blanks submitted?	○	○	●	listed on COC ☐ not listed on COC ☐	

27. Comments: _____

I certify that I have completed sections 16-27 (dated initials). AP 5/7/19

This section only applies to samples where pH can be checked at Sample Receipt.

		Yes	No	N/A	Details	Comments
28.	Have containers needing chemical preservation been checked? *	○	○	●		
29.	Containers meet preservation guidelines?	○	○	●		
30.	Was pH adjusted at Sample Receipt?	○	○	●		

* Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH.

I certify that I have completed sections 28-30 (dated initials). AP 5/7/19

Checklist 6.9.17 Rev 2

Locked

Client: Prism Laboratories
Project Name: 9050081
Lab Order: 1905511

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1905511-001A	B-21 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-001A	B-21 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/13/2019 9:05:00AM	05/13/2019
1905511-001A	B-21 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-002A	B-22 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-002A	B-22 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-002A	B-22 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-003A	B-25 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-003A	B-25 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-003A	B-25 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-004A	B-27 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-004A	B-27 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-004A	B-27 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-005A	B-30 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-005A	B-30 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-005A	B-30 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-006A	B-31 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-006A	B-31 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-006A	B-31 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-007A	B-36 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-007A	B-36 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-007A	B-36 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-008A	B-37 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-008A	B-37 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/13/2019 9:05:00AM	05/13/2019
1905511-008A	B-37 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-009A	B-39 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-009A	B-39 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-009A	B-39 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-010A	B-59 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-010A	B-59 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019

Client: Prism Laboratories
Project Name: 9050081
Lab Order: 1905511

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1905511-010A	B-59 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019
1905511-011A	B-62/B-63 COMP	4/10/2019 12:01:00AM	Soil	Sulfide		5/9/2019 9:30:00AM	05/09/2019
1905511-011A	B-62/B-63 COMP	4/10/2019 12:01:00AM	Soil	Soil Resistivity		5/8/2019 3:00:00PM	05/13/2019
1905511-011A	B-62/B-63 COMP	4/10/2019 12:01:00AM	Soil	PERCENT MOISTURE			05/10/2019

Client: Prism Laboratories
Project Name: 9050081
Workorder: 1905511

ANALYTICAL QC SUMMARY REPORT

BatchID: 278891

Sample ID: **LCS-278891**	Client ID:				Units: **ohms*cm**	Prep Date: **05/08/2019**	Run No: **398003**
SampleType: **LCS**	TestCode: **Soil Resistivity SW9050A**				BatchID: **278891**	Analysis Date: **05/13/2019**	Seq No: **8917808**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	10400	0	**10000**		104	90	110				

Sample ID: **1905511-002ADUP**	Client ID: **B-22 COMP**				Units: **ohms*cm**	Prep Date: **05/08/2019**	Run No: **398003**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **278891**	Analysis Date: **05/13/2019**	Seq No: **8917825**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	19490	0						20370	4.38	30	H

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: Prism Laboratories
Project Name: 9050081
Workorder: 1905511

ANALYTICAL QC SUMMARY REPORT

BatchID: 278916

Sample ID: **MB-278916**	Client ID:					Units: **mg/Kg**		Prep Date: **05/09/2019**		Run No: **397826**	
SampleType: **MBLK**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **278916**		Analysis Date: **05/09/2019**		Seq No: **8913047**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	BRL	40.0									

Sample ID: **LCS-278916**	Client ID:					Units: **mg/Kg**		Prep Date: **05/09/2019**		Run No: **397826**	
SampleType: **LCS**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **278916**		Analysis Date: **05/09/2019**		Seq No: **8913050**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	800.0	40.0	800.0		100	70	130				

Sample ID: **1905399-001CMS**	Client ID:					Units: **mg/Kg-dry**		Prep Date: **05/09/2019**		Run No: **397826**	
SampleType: **MS**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **278916**		Analysis Date: **05/09/2019**		Seq No: **8913053**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	3196	153	3050		105	68.9	122				

Sample ID: **1905399-001CMSD**	Client ID:					Units: **mg/Kg-dry**		Prep Date: **05/09/2019**		Run No: **397826**	
SampleType: **MSD**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **278916**		Analysis Date: **05/09/2019**		Seq No: **8913054**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	3036	153	3050		99.5	68.9	122	3196	5.14	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: Prism Laboratories
Project Name: 9050081
Workorder: 1905511

ANALYTICAL QC SUMMARY REPORT

BatchID: 279011

Sample ID: LCS-279011	Client ID:				Units: ohms*cm	Prep Date: 05/13/2019	Run No: 398004
SampleType: LCS	TestCode: Soil Resistivity SW9050A				BatchID: 279011	Analysis Date: 05/13/2019	Seq No: 8917876

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	10400	0	10000		104	90	110				

Sample ID: 1905535-001ADUP	Client ID:				Units: ohms*cm	Prep Date: 05/13/2019	Run No: 398004
SampleType: DUP	TestCode: Soil Resistivity SW9050A				BatchID: 279011	Analysis Date: 05/13/2019	Seq No: 8917885

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	12020	0						12250	1.94	30	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Prism Laboratories, Inc.
PO BOX 240543
Charlotte, NC 28224

ATTENTION
Angela Overcash

PROJECT ID
9050081

LABORATORY REPORT NUMBER
219050736

DATE
05/15/2019

Primary Data Review By

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 Innovation Park Dr., Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

GCAL
ANALYTICAL LABORATORIES, LLC

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 05/15/2019

GCAL Report 219050736

Project 9050081

Deliver To	*Additional Recipients*
Angela Overcash Prism Laboratories, Inc. PO BOX 240543 Charlotte, NC 28224 706-529-6364	NONE

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL Report 219050736

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: Access Analytical **Report:** 219050736

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21905073601	B-21 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073602	B-22 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073603	B-25 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073604	B-27 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073605	B-30 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073606	B-31 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073607	B-36 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073608	B-37 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073609	B-39 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073610	B-59 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00
21905073611	B-62/B-63 Comp	Solid	04/10/2019 00:01	05/07/2019 10:00

Summary of Compounds Detected

B-21 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073601
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	376			mV

B-22 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073602
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	386			mV

B-25 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073603
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

B-27 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073604
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

Summary of Compounds Detected

B-30 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073605
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	397			mV

B-31 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073606
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	384			mV

B-36 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073607
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

B-37 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073608
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	377			mV

Summary of Compounds Detected

B-39 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073609
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

B-59 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073610
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

B-62/B-63 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073611
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	389			mV

Sample Results

B-21 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073601
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	376			mV

B-22 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073602
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	386			mV

B-25 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073603
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

B-27 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073604
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

Sample Results

B-30 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073605
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	397			mV

B-31 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073606
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	384			mV

B-36 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073607
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

Sample Results

B-37 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073608
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	377			mV

B-39 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073609
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	393			mV

B-59 Comp

Collect Date 04/10/2019 00:01 **GCAL ID** 21905073610
Receive Date 05/07/2019 10:00 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

Sample Results

B-62/B-63 Comp	**Collect Date**	04/10/2019 00:01	**GCAL ID**	21905073611
	Receive Date	05/07/2019 10:00	**Matrix**	Solid

HACH Method 10228

*Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	05/14/2019 15:32	AJE	660074

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	389			mV

Sub to GC4L
No

Client ID: 4565 - Access Analytical
SDG: 219050736
PM: DLH

PRISM Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9050081

Certification: NELAC___ USACE___
NC__/ SC__ Other_____
N/A____

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Gulf Coast Analytical Labs, Inc.
10781 Coursey Blvd
Baton Rouge, LA 70816
Phone :(225) 769-4900
Fax: (225) 767-5717

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9050081-01	Solid	Sampled: 04/10/19 00:00	B-21 Comp	-1
ORP (Sub)		04/15/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9050081-02	Solid	Sampled: 04/10/19 00:00	B-22 Comp	-2
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-03	Solid	Sampled: 04/10/19 00:00	B-25 Comp	-3
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-04	Solid	Sampled: 04/10/19 00:00	B-27 Comp	-4
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-05	Solid	Sampled: 04/10/19 00:00	B-30 Comp	-5
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
~~Sample ID: 9050081-06~~	~~Solid~~	~~Sampled: 04/10/19 00:00~~		See Page 2

Released By: Jaboy	Date: 5.6.19	Received By: Fed Ex	Date:
Released By: Fed Ex	Date:	Received By: DoddieMcClure GC4L	Date: 5-7-19 10:00
Released By	Date	Received By	Date
Released By	Date	Received By	Date

~~7761145~~ DNM 7514578728 0.4 EDD PM

Page 1 of 2

Client ID: 4565 - Access Analytical

SDG: 219050736

PM: DLH

UBCONTRACT ORDER

Prism Laboratories, Inc.

9050081

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A___

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9050081-06	Solid	Sampled: 04/10/19 00:00	B-31 Comp	-6
ORP (Sub)		04/15/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9050081-07	Solid	Sampled: 04/10/19 00:00	B-36 Comp	-7
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-08	Solid	Sampled: 04/10/19 00:00	B-37 Comp	-8
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-09	Solid	Sampled: 04/10/19 00:00	B-39 Comp	-9
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-10	Solid	Sampled: 04/10/19 00:00	B-59 Comp	-10
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				
Sample ID: 9050081-11	Solid	Sampled: 04/10/19 00:00	B-62/B-63 Comp	-11
ORP (Sub)		04/15/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
FedEx	5.6.19	FedEx	
Released By	Date	Received By	Date
		Doug McGuire GCAL	5-7-19 10:00
Released By	Date	Received By	Date
Released By	Date	Received By	Date
		775145786228 04 FOU DLH	

Page 2 of 2

SAMPLE RECEIVING CHECKLIST

219050736

SAMPLE DELIVERY GROUP 219050736	
Client PM DLH 4565 - Access Analytical	**Transport Method** FEDEX
Profile Number 80251	**Received By** Savage, Tiffany R
Line Item(s) 2 - Solid	**Receive Date(s)** 05/07/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by GCAL?	☐	☑

COOLERS

Airbill	Thermometer ID: E29	Temp °C
7751-4578-6228		0.4

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

NC Certification No. 402
NC Drinking Water Cert No. 37735
SC Certification No. 99012

Case Narrative

6/25/19 15:33

Froehling & Robertson, Inc. (Raleigh)
Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Lab Submittal Date: 06/13/2019
Prism Work Order: 9060211

This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

Narrative Notes:

Sulfide and Resistivity analysis was subcontracted to Analytical Environmental Labs Inc. Laboratory report is attached.

ORP analysis was subcontracted to Gulf Coast Analytical Labs Inc. Laboratory report is attached.

Prism Summary of Detections does not include subcontracted data.

Please call if you have any questions relating to this analytical report.

Respectfully,

PRISM LABORATORIES, INC.

Angela D. Overcash

VP Laboratory Services

Reviewed By Terri W. Cole For Angela D. Overcash

Project Manager

Data Qualifiers Key Reference:

BRL	Below Reporting Limit
MDL	Method Detection Limit
RPD	Relative Percent Difference
*	Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

Sample Receipt Summary

06/25/2019

Prism Work Order: 9060211

Client Sample ID	Lab Sample ID	Matrix	Date/Time Sampled	Date/Time Received
B-1 (S-4, S-5) (13.5-15, 18.5-20)	9060211-01	Solid	06/04/19 0:00	06/13/19 8:00
B-7 (S-3, S-4) (8.5-10, 13.5-15)	9060211-02	Solid	06/04/19 0:00	06/13/19 8:00
B-4, B-5 (S-5, 18.5-20)	9060211-03	Solid	06/05/19 0:00	06/13/19 8:00
B-9 (S-3, S-4) (8.5-10, 13.5-15)	9060211-04	Solid	06/06/19 0:00	06/13/19 8:00
B-80 (S-3, S-4) (8.5-10, 13.5-15)	9060211-05	Solid	06/04/19 0:00	06/13/19 8:00
B-81 (S-2, S-3) (3.5-5, 8.5-10)	9060211-06	Solid	06/04/19 0:00	06/13/19 8:00

Samples were received at 22.2 degrees C. See case narrative for further information.

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-1 (S-4, S-5) (13.5-15, 18.5-20)
Prism Sample ID: 9060211-01
Prism Work Order: 9060211
Time Collected: 06/04/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.5	1	*9056A	6/18/19 15:02	BMS	P9F0259
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	6/18/19 15:02	BMS	P9F0259
General Chemistry Parameters									
% Solids	**85.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**5.2**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**15.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-7 (S-3, S-4) (8.5-10, 13.5-15)
Prism Sample ID: 9060211-02
Prism Work Order: 9060211
Time Collected: 06/04/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	6/18/19 15:17	BMS	P9F0259
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	6/18/19 15:17	BMS	P9F0259
General Chemistry Parameters									
% Solids	**84.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**5.1**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**15.7**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-4, B-5 (S-5, 18.5-20)
Prism Sample ID: 9060211-03
Prism Work Order: 9060211
Time Collected: 06/05/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.7	1	*9056A	6/18/19 15:32	BMS	P9F0259
Sulfate	**270**	**mg/kg dry**	**180**	**53**	**1**	***9056A**	**6/18/19 15:32**	**BMS**	**P9F0259**
General Chemistry Parameters									
% Solids	**82.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**5.0**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**17.2**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-9 (S-3, S-4) (8.5-10, 13.5-15)
Prism Sample ID: 9060211-04
Prism Work Order: 9060211
Time Collected: 06/06/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	28	8.0	1	*9056A	6/18/19 15:46	BMS	P9F0259
Sulfate	BRL	mg/kg dry	170	49	1	*9056A	6/18/19 15:46	BMS	P9F0259
General Chemistry Parameters									
% Solids	**90.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**4.1**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**9.72**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-80 (S-3, S-4) (8.5-10, 13.5-15)
Prism Sample ID: 9060211-05
Prism Work Order: 9060211
Time Collected: 06/04/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.8	1	*9056A	6/18/19 16:01	BMS	P9F0259
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	6/18/19 16:01	BMS	P9F0259
General Chemistry Parameters									
% Solids	**82.2**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**5.6**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**17.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

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Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-81 (S-2, S-3) (3.5-5, 8.5-10)
Prism Sample ID: 9060211-06
Prism Work Order: 9060211
Time Collected: 06/04/19 00:00
Time Submitted: 06/13/19 08:00

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.3	1	*9056A	6/18/19 16:16	BMS	P9F0259
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	6/18/19 16:16	BMS	P9F0259
General Chemistry Parameters									
% Solids	**87.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**
pH	**5.2**	**pH Units**			**1**	***9045D**	**6/14/19 15:33**	**BMS**	**P9F0241**
% Moisture	**13.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**6/18/19 8:30**	**KBS**	**P9F0255**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9060211
Time Submitted: 6/13/2019 8:00:00AM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9F0259 - Default Prep GenChem										
Blank (P9F0259-BLK1)				Prepared & Analyzed: 06/18/19						
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9F0259-BS1)				Prepared & Analyzed: 06/18/19						
Chloride	1020	25	mg/kg wet	1000		102	80-120			
Sulfate	1010	150	mg/kg wet	1000		101	80-120			

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9060211
Time Submitted: 6/13/2019 8:00:00AM

General Chemistry Parameters - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9F0241 - NO PREP										
LCS (P9F0241-BS1)				Prepared & Analyzed: 06/14/19						
pH	6.86		pH Units	6.880		99.7	98.5-101.5			
Batch P9F0255 - NO PREP										
Duplicate (P9F0255-DUP2)		**Source: 9060211-05**		Prepared: 06/17/19 Analyzed: 06/18/19						
% Solids	81.6	0.100	% by Weight		82.2			0.6	20	
% Moisture	18.4	0.100	% by Weight		17.8			3	20	

Sample Extraction Data

Prep Method: Default Prep GenChem

Lab Number	Batch	Initial	Final	Date/Time
9060211-01	P9F0259	5 g	50 mL	06/18/19 9:45
9060211-02	P9F0259	5 g	50 mL	06/18/19 9:45
9060211-03	P9F0259	5 g	50 mL	06/18/19 9:45
9060211-04	P9F0259	5 g	50 mL	06/18/19 9:45
9060211-05	P9F0259	5 g	50 mL	06/18/19 9:45
9060211-06	P9F0259	5 g	50 mL	06/18/19 9:45

Subcontracted Analyses

The following analyses were subcontracted to Analytical Environmental Services, Inc.

Lab Number	Analysis
9060211-01	Resistivity (Sub)
9060211-01	Sulfide (Sub)
9060211-02	Resistivity (Sub)
9060211-02	Sulfide (Sub)
9060211-03	Resistivity (Sub)
9060211-03	Sulfide (Sub)
9060211-04	Resistivity (Sub)
9060211-04	Sulfide (Sub)
9060211-05	Resistivity (Sub)
9060211-05	Sulfide (Sub)
9060211-06	Resistivity (Sub)
9060211-06	Sulfide (Sub)

The following analyses were subcontracted to Gulf Coast Analytical Labs, Inc.

Lab Number	Analysis
9060211-01	ORP (Sub)
9060211-02	ORP (Sub)
9060211-03	ORP (Sub)
9060211-04	ORP (Sub)
9060211-05	ORP (Sub)
9060211-06	ORP (Sub)

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

IRT-13 22.1.2

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: _____

Project Name: FAYPWC BIG ROCKFISH CREEK OUTFALL
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT ~~ADD~~ STREET

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310 HUBERT STREET, RALEIGH, NC, 27603
Phone: 919-719-1845 Fax (Yes) (No): _____
Email (Yes) (No) Email Address MKAYSER@FandR.com
EDD Type: ____ PDF ✓ Excel ____ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: Various

Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	✓		
Received ON WET ICE? Temp ____		✓	
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			✓
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ____ USACE ____ FL ____ NC ____
SC ____ OTHER ____ N/A ____
Water Chlorinated: YES ____ NO ____
Sample Iced Upon Collection: YES ____ NO ____

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	pH	Chloride	Sulfate	Electrical Resistivity	Red ox	Sulfide	REMARKS	PRISM LAB ID NO.
~~ADD~~ Composite B-1 (5-4, 5-5) (13.5-15, 18.5-20)	6/4/19		SOIL	G				↓	↓	↓	↓	↓	↓	↓		01
B-7 (5-3, 5-4) (8.5-10, 13.5-15)	6/4/19		SOIL	G												02
B-4 (5-5, 18.5-20) B-5 (5-5, 18.5-20)	6/5/19		↓	↓												03
B-9 (5-3, 5-4) (8.5-10, 13.5-15)	6/6/19															04
B-80 (5-3, 5-4) (8.5-10, 13.5-15)	6/4/19															05
B-81 (5-2, 5-3) (3.5-5, 8.5-10)	6/4/19															06

Sampler's Signature F.A. KAYSER Sampled By (Print Name) MOHAMMAD KAYSER Affiliation _____

PRESS DOWN FIRMLY - 3 COPIES

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	Date 6-12-19	Military/Hours 1205
Relinquished By: (Signature) 6-13-19 0800	Received By: (Signature)	Date	
Relinquished By: (Signature)	Received For Prism Laboratories By:	Date 6-13-19	0800

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.
☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other _____
Log-In Group No. 9060211

Additional Comments: ~~Add~~ Composite Samples (total 6 sets)

PRISM USE ONLY

Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC
☐ _____	☐ _____	☐ _____	☐ _____	☐ _____	☐ _____	☐ _____	☐ _____	☐ _____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT

Prism Laboratories
PO Box 240543
Charlotte NC 282240543

ATTENTION
Angela Overcash

PROJECT ID
9060211

LABORATORY REPORT NUMBER
1906G45

DATE
June 24, 2019

Primary Data Review By

Chris Pafford
Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.**
- **AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582**
- **AIHA-LAP,LLC Laboratory ID:100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.**
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll fee at 883.315.4243

1906G45

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060211

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Analytical Environmental Services, Inc.
3080 Presidential Parkway
Atlanta, GA 30340
Phone :(770) 457-8177
Fax: NA

Need 5 dy TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060211-01	**Solid**	**Sampled:06/04/19 00:00**	B-1 (S-4, S-5)	
Sulfide (Sub)		06/11/19 00:00	(13.5-15, 18.5-20)	
Resistivity (Sub)		07/02/19 00:00		
Containers Supplied:				
4 oz glass jar				
Sample ID: 9060211-02	**Solid**	**Sampled:06/04/19 00:00**	B-7 (S-3, S-4)	
Sulfide (Sub)		06/11/19 00:00	(8.5-10, 13.5-15)	
Resistivity (Sub)		07/02/19 00:00		
Containers Supplied:				
Sample ID: 9060211-03	**Solid**	**Sampled:06/05/19 00:00**	B-4 (S-5, 18.5-20)	
Sulfide (Sub)		06/12/19 00:00	B-5 (S-5, 18.5-20)	
Resistivity (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060211-04	**Solid**	**Sampled:06/06/19 00:00**	B9 (S-3, S-4)	
Sulfide (Sub)		06/13/19 00:00	(8.5-10, 13.5-15)	
Resistivity (Sub)		07/04/19 00:00		
Containers Supplied				

Released By	Date	Received By	Date
[signature]	6/14/19	FedEx	6/14/19
FedEx	6/15/19	[illegible] courier	6/15/19 1122
Released By	Date	Received By	Date
Released By	Date	Received By	Date
Released By	Date	Received By	Date

1906645

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060211

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A____

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060211-05	**Solid**	**Sampled:06/04/19 00:00**	B-80 (S-3, S-4)	
Sulfide (Sub)		06/11/19 00:00	(8.5-10, 13.5-15)	
Resistivity (Sub)		07/02/19 00:00		
Containers Supplied: 4oz glass Jar				
Sample ID: 9060211-06	**Solid**	**Sampled:06/04/19 00:00**	B-81 (S-2, S-3)	
Sulfide (Sub)		06/11/19 00:00	(3.5-5, 8.5-10)	
Resistivity (Sub)		07/02/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
[signature]	6/14/19	FedEx	
FedEx	6/15/19	[signature]	6/15/19 1122
Released By	Date	Received By	Date
Released By	Date	Received By	Date
Released By	Date	Received By	Date

Analytical Environmental Services, Inc

Date: 25-Jun-19

Client: Prism Laboratories
Project: 9060211
Lab ID: 1906G45

Case Narrative

Sample Receiving Nonconformance:

1906G45 was received outside Sulfide method 9034 specified holding time of 7 days. The laboratory proceeded with analysis per client project history.

Analytical Environmental Services, Inc **Date:** 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B-1 (S-4, S-5) (13.5-15, 18.5-20)
Lab Order	1906G45	**Tag Number:**	9060211-01
Project Name:	9060211	**Collection Date:**	6/4/2019 12:01:00 AM
Lab ID:	1906G45-001A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	43.7	52.0	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	7360		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	21.6		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B-7 (S-3, S-4) (8.5-10, 13.5-15)
Lab Order	1906G45	**Tag Number:**	9060211-02
Project Name:	9060211	**Collection Date:**	6/4/2019 12:01:00 AM
Lab ID:	1906G45-002A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					(SW9030B)				
Sulfide	BRL	H	41.8	49.7	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					(SW9050A)				
Resistivity (@100% Moisture Saturation)	6530		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	23.4		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B-4 (S-5, 18.5-20) B-5 (S-5, 18.5-
Lab Order	1906G45	**Tag Number:**	9060211-03
Project Name:	9060211	**Collection Date:**	6/5/2019 12:01:00 AM
Lab ID:	1906G45-003A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	39.1	46.6	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	12000		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	14.1		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B9 (S-3, S-4) (8.5-10, 13.5-15)
Lab Order	1906G45	**Tag Number:**	9060211-04
Project Name:	9060211	**Collection Date:**	6/6/2019 12:01:00 AM
Lab ID:	1906G45-004A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	36.8	43.8	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	12800		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	10.4		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

- `*` Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B-80 (S-3, S-4) (8.5-10, 13.5-15)
Lab Order	1906G45	**Tag Number:**	9060211-05
Project Name:	9060211	**Collection Date:**	6/4/2019 12:01:00 AM
Lab ID:	1906G45-005A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	42.1	50.1	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	18100		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	21.7		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc Date: 24-Jun-19

Client:	Prism Laboratories	**Client Sample ID:**	B-81 (S-2, S-3) (3.5-5, 8.5-10)
Lab Order	1906G45	**Tag Number:**	9060211-06
Project Name:	9060211	**Collection Date:**	6/4/2019 12:01:00 AM
Lab ID:	1906G45-006A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	40.8	48.6	mg/Kg-dry	281052	1	06/21/2019 10:00	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	16500		0	0	ohms*cm	280974	1	06/19/2019 08:00	BK
PERCENT MOISTURE D2216									
Percent Moisture	20.1		0	0	wt%	R400967	1	06/20/2019 13:30	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Clear Save as

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

SAMPLE/COOLER RECEIPT CHECKLIST

1. Client Name: Access Analytical, Inc. AES Work Order Number: 1906G45

2. Carrier: FedEx [■] UPS [ ] USPS [ ] Client [ ] Courier [ ] Other _____

		Yes	No	N/A	Details	Comments
3	Shipping container/cooler received in good condition?	◉	○	○	damaged ☐ leaking ☐ other ☐	
4	Custody seals present on shipping container?	○	◉	○		
5	Custody seals intact on shipping container?	○	○	◉		
6	Temperature blanks present?	○	◉	○		
7	Cooler temperature(s) within limits of 0-6°C? [See item 13 and 14 for temperature recordings.]	◉	○	○	Cooling initiated for recently collected samples / ice present ☐	
8	Chain of Custody (COC) present?	◉	○	○		
9	Chain of Custody signed, dated, and timed when relinquished and received?	◉	○	○		
10	Sampler name and/or signature on COC?	○	◉	○		
11	Were all samples received within holding time?	○	◉	○		
12	TAT marked on the COC?	◉	○	○	If no TAT indicated, proceeded with standard TAT per Terms & Conditions. ☐	

13. Cooler 1 Temperature 0.6 °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C

14. Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

15. Comments: _____

I certify that I have completed sections 1-15 (dated initials). MH 6/15/19

		Yes	No	N/A	Details	Comments
16	Were sample containers intact upon receipt?	◉	○	○		
17	Custody seals present on sample containers?	○	◉	○		
18	Custody seals intact on sample containers?	○	○	◉		
19	Do sample container labels match the COC?	◉	○	○	incomplete info ☐ illegible ☐ no label ☐ other ☐	
20	Are analyses requested indicated on the COC?	◉	○	○		
21	Were all of the samples listed on the COC received?	◉	○	○	samples received but not listed on COC ☐ samples listed on COC not received ☐	
22	Was the sample collection date/time noted?	◉	○	○		
23	Did we receive sufficient sample volume for indicated analyses?	◉	○	○		
24	Were samples received in appropriate containers?	◉	○	○		
25	Were VOA samples received without headspace (< 1/4" bubble)?	○	○	◉		
26	Were trip blanks submitted?	○	○	◉	listed on COC ☐ not listed on COC ☐	

27. Comments: _____

I certify that I have completed sections 16-27 (dated initials). BC 6/15/19

This section only applies to samples where pH can be checked at Sample Receipt.

		Yes	No	N/A	Details	Comments
28	Have containers needing chemical preservation been checked? *	○	○	◉		
29	Containers meet preservation guidelines?	○	○	◉		
30	Was pH adjusted at Sample Receipt?	○	○	◉		

* Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH.

I certify that I have completed sections 28-30 (dated initials). BC 6/15/19

Checklist 6.9.17 Rev 2

Locked

Client: Prism Laboratories
Project Name: 9060211
Lab Order: 1906G45

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1906G45-001A	B-1 (S-4, S-5) (13.5-15, 18.5-2	6/4/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-001A	B-1 (S-4, S-5) (13.5-15, 18.5-2	6/4/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-001A	B-1 (S-4, S-5) (13.5-15, 18.5-2	6/4/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019
1906G45-002A	B-7 (S-3, S-4) (8.5-10, 13.5-15	6/4/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-002A	B-7 (S-3, S-4) (8.5-10, 13.5-15	6/4/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-002A	B-7 (S-3, S-4) (8.5-10, 13.5-15	6/4/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019
1906G45-003A	B-4 (S-5, 18.5-20) B-5 (S-5, 18	6/5/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-003A	B-4 (S-5, 18.5-20) B-5 (S-5, 18	6/5/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-003A	B-4 (S-5, 18.5-20) B-5 (S-5, 18	6/5/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019
1906G45-004A	B9 (S-3, S-4) (8.5-10, 13.5-15)	6/6/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-004A	B9 (S-3, S-4) (8.5-10, 13.5-15)	6/6/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-004A	B9 (S-3, S-4) (8.5-10, 13.5-15)	6/6/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019
1906G45-005A	B-80 (S-3, S-4) (8.5-10, 13.5-1	6/4/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-005A	B-80 (S-3, S-4) (8.5-10, 13.5-1	6/4/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-005A	B-80 (S-3, S-4) (8.5-10, 13.5-1	6/4/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019
1906G45-006A	B-81 (S-2, S-3) (3.5-5, 8.5-10)	6/4/2019 12:01:00AM	Soil	Sulfide		6/20/2019 9:30:00AM	06/21/2019
1906G45-006A	B-81 (S-2, S-3) (3.5-5, 8.5-10)	6/4/2019 12:01:00AM	Soil	Soil Resistivity		6/19/2019 8:00:00AM	06/19/2019
1906G45-006A	B-81 (S-2, S-3) (3.5-5, 8.5-10)	6/4/2019 12:01:00AM	Soil	PERCENT MOISTURE			06/20/2019

Client: Prism Laboratories
Project Name: 9060211
Workorder: 1906G45

ANALYTICAL QC SUMMARY REPORT

BatchID: 280974

Sample ID: **LCS-280974**	Client ID:				Units: **ohms*cm**	Prep Date: **06/19/2019**	Run No: **401022**
SampleType: **LCS**	TestCode: **Soil Resistivity SW9050A**				BatchID: **280974**	Analysis Date: **06/19/2019**	Seq No: **8996790**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	10240	0	10000		102	90	110				

Sample ID: **1906E24-001ADUP**	Client ID:				Units: **ohms*cm**	Prep Date: **06/19/2019**	Run No: **401022**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **280974**	Analysis Date: **06/19/2019**	Seq No: **8996809**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	2571	0						2538	1.28	30	

Sample ID: **1906I64-001ADUP**	Client ID:				Units: **ohms*cm**	Prep Date: **06/19/2019**	Run No: **401022**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **280974**	Analysis Date: **06/19/2019**	Seq No: **8996805**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	1370	0						1414	3.20	30	

Qualifiers:

*	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: Prism Laboratories
Project Name: 9060211
Workorder: 1906G45

ANALYTICAL QC SUMMARY REPORT

BatchID: 281052

Sample ID: **MB-281052**	Client ID:				Units: **mg/Kg**	Prep Date: **06/20/2019**	Run No: **401138**
SampleType: **MBLK**	TestCode: **Sulfide by SW9030B/9034**				BatchID: **281052**	Analysis Date: **06/21/2019**	Seq No: **8999529**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	BRL	40.0									

Sample ID: **LCS-281052**	Client ID:				Units: **mg/Kg**	Prep Date: **06/20/2019**	Run No: **401138**
SampleType: **LCS**	TestCode: **Sulfide by SW9030B/9034**				BatchID: **281052**	Analysis Date: **06/21/2019**	Seq No: **8999530**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	920.0	40.0	920.0		100	70	130				

Sample ID: **1906G43-001AMS**	Client ID:				Units: **mg/Kg-dry**	Prep Date: **06/20/2019**	Run No: **401138**
SampleType: **MS**	TestCode: **Sulfide by SW9030B/9034**				BatchID: **281052**	Analysis Date: **06/21/2019**	Seq No: **8999536**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1037	45.6	1049		98.8	68.9	122				H

Sample ID: **1906G43-001AMSD**	Client ID:				Units: **mg/Kg-dry**	Prep Date: **06/20/2019**	Run No: **401138**
SampleType: **MSD**	TestCode: **Sulfide by SW9030B/9034**				BatchID: **281052**	Analysis Date: **06/21/2019**	Seq No: **8999537**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	930.0	44.7	1029		90.4	68.9	122	1037	10.9	20	H

Qualifiers:

*	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Prism Laboratories, Inc.
PO BOX 240543
Charlotte, NC 28224

ATTENTION
Angela Overcash

PROJECT ID
9060211

LABORATORY REPORT NUMBER
219061510

DATE
06/19/2019

Primary Data Review By

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 Innovation Park Dr., Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 06/19/2019

GCAL Report 219061510

Project 9060211

Deliver To	*Additional Recipients*
Angela Overcash Prism Laboratories, Inc. PO BOX 240543 Charlotte, NC 28224 706-529-6364	NONE

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL Report 219061510

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: Access Analytical **Report:** 219061510

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21906151001	B-1 (S-4,S-5) 13.5-15, 18.5-20	Solid	06/04/2019 00:01	06/15/2019 09:40
21906151002	B-7 (S-3, S-4) 8.5-10, 13.5-15	Solid	06/04/2019 00:01	06/15/2019 09:40
21906151003	B-4, B-5 (S-5, 18.5-20)	Solid	06/05/2019 00:01	06/15/2019 09:40
21906151004	B-9 (S-3, S-4) 8.5-10, 13.5-15	Solid	06/06/2019 00:01	06/15/2019 09:40
21906151005	B80 (S-3, S-4) 8.5-10, 13.5-15	Solid	06/04/2019 00:01	06/15/2019 09:40
21906151006	B81 (S-2, S-3) 3.5-5, 8.5-10	Solid	06/04/2019 00:01	06/15/2019 09:40

Summary of Compounds Detected

B-1 (S-4,S-5) 13.5-15, 18.5-20

Collect Date 06/04/2019 00:01 GCAL ID 21906151001
Receive Date 06/15/2019 09:40 Matrix Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	374			mV

B-7 (S-3, S-4) 8.5-10, 13.5-15

Collect Date 06/04/2019 00:01 GCAL ID 21906151002
Receive Date 06/15/2019 09:40 Matrix Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	379			mV

B-4, B-5 (S-5, 18.5-20)

Collect Date 06/05/2019 00:01 GCAL ID 21906151003
Receive Date 06/15/2019 09:40 Matrix Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

B-9 (S-3, S-4) 8.5-10, 13.5-15

Collect Date 06/06/2019 00:01 GCAL ID 21906151004
Receive Date 06/15/2019 09:40 Matrix Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	388			mV

Summary of Compounds Detected

B80 (S-3, S-4) 8.5-10, 13.5-15	Collect Date	06/04/2019 00:01	GCAL ID	21906151005
	Receive Date	06/15/2019 09:40	Matrix	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	376			mV

B81 (S-2, S-3) 3.5-5, 8.5-10	Collect Date	06/04/2019 00:01	GCAL ID	21906151006
	Receive Date	06/15/2019 09:40	Matrix	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	380			mV

Sample Results

B-1 (S-4,S-5) 13.5-15, 18.5-20

Collect Date: 06/04/2019 00:01 | GCAL ID: 21906151001
Receive Date: 06/15/2019 09:40 | Matrix: Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	374			mV

B-7 (S-3, S-4) 8.5-10, 13.5-15

Collect Date: 06/04/2019 00:01 | GCAL ID: 21906151002
Receive Date: 06/15/2019 09:40 | Matrix: Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	379			mV

B-4, B-5 (S-5, 18.5-20)

Collect Date: 06/05/2019 00:01 | GCAL ID: 21906151003
Receive Date: 06/15/2019 09:40 | Matrix: Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	387			mV

B-9 (S-3, S-4) 8.5-10, 13.5-15

Collect Date: 06/06/2019 00:01 | GCAL ID: 21906151004
Receive Date: 06/15/2019 09:40 | Matrix: Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	388			mV

Sample Results

B80 (S-3, S-4) 8.5-10, 13.5-15	**Collect Date**	06/04/2019 00:01	**GCAL ID**	21906151005
	Receive Date	06/15/2019 09:40	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	376			mV

B81 (S-2, S-3) 3.5-5, 8.5-10	**Collect Date**	06/04/2019 00:01	**GCAL ID**	21906151006
	Receive Date	06/15/2019 09:40	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	06/19/2019 11:18	AJE	662217

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	380			mV

Client ID: 4565 - Access Analytical

SDG: 219061510

PM: DLH

PRISM Laboratories, Inc. | Full-Service Analytical & Environmental Solutions

0.5°C E-26 54CPM
7754-7953-7359

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060211

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Gulf Coast Analytical Labs, Inc.
10781 Coursey Blvd
Baton Rouge, LA 70816
Phone :(225) 769-4900
Fax: (225) 767-5717

Need 5 day TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060211-01	**Solid**	**Sampled:06/04/19 00:00**	B-1 (S-4, S-5)	-1
ORP (Sub)		06/09/19 00:00	(8.5-10, 18.5-20)	
Containers Supplied: 4oz glass jar				
Sample ID: 9060211-02	**Solid**	**Sampled:06/04/19 00:00**	B-7 (S-3, S-4)	-2
ORP (Sub)		06/09/19 00:00	(8.5-10, 13.5-15)	
Containers Supplied:				
Sample ID: 9060211-03	**Solid**	**Sampled:06/05/19 00:00**	B-4 (S-5, 18.5-20)	-3
ORP (Sub)		06/10/19 00:00	B-5 (S-5, 18.5-20)	
Containers Supplied:				
Sample ID: 9060211-04	**Solid**	**Sampled:06/06/19 00:00**	B9 (S-3 S-4)	-4
ORP (Sub)		06/11/19 00:00	(8.5-10, 13.5-15)	
Containers Supplied:				
Sample ID: 9060211-05	**Solid**	**Sampled:06/04/19 00:00**	B80 (S-3, S-4)	-5
ORP (Sub)		06/09/19 00:00	(8.5-10, 13.5-15)	

Released By	Date	Received By	Date
	6/14/19		6/14/19
Fedex	6/15/19		6/15/19 09:40

Client ID: 4565 - Access Analytical

SDG: 219061510

PM: DLH

CBCONTRACT ORDER

Prism Laboratories, Inc.

9060211

Certification: NELAC___ USACE___
NC___ SC___ Other ___
N/A___

Analysis	Due	Expires	Laboratory ID	Comments
Containers Supplied:				
Sample ID: 9060211-06	Solid	Sampled:06/04/19 00:00	B-81 (S-2, S-3)	-6
ORP (Sub)		06/09/19 00:00	(3.5-5, 8.5-10)	
Containers Supplied: 4oz glass jar				

0.5°C E26 54CPM
7754-7953-7389

Released By	Date	Received By	Date
[signature]	6/14/19	[signature]	6/14/19
Fedex	6/15/19	[signature]	6/15/19 09:40

SAMPLE RECEIVING CHECKLIST

219061510

SAMPLE DELIVERY GROUP 219061510	
Client PM DLH 4565 - Access Analytical	**Transport Method** FEDEX
Profile Number 80251	**Received By** Savage, Tiffany R
Line Item(s) 2 - Solid	**Receive Date(s)** 06/15/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by GCAL?	☐	☑

COOLERS

Airbill	Thermometer ID: E26	Temp °C
7754-7953-7389		0.5

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

NC Certification No. 402
NC Drinking Water Cert No. 37735
SC Certification No. 99012

Case Narrative

7/9/19 12:50

Froehling & Robertson, Inc. (Raleigh)
Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Lab Submittal Date: 06/26/2019
Prism Work Order: 9060372

This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

Narrative Notes:

Sulfide and Resistivity analysis was subcontracted to Analytical Environmental Services Inc. Laboratory report is attached.

ORP analysis was subcontracted to Gulf Coast Analytical Labs Inc. Laboratory report is attached.

Prism Summary of Detections does not include subcontracted data.

Please call if you have any questions relating to this analytical report.

Respectfully,

PRISM LABORATORIES, INC.

Angela D. Overcash

VP Laboratory Services

Reviewed By Terri W. Cole For Angela D. Overcash

Project Manager

Data Qualifiers Key Reference:

BRL	Below Reporting Limit
MDL	Method Detection Limit
RPD	Relative Percent Difference
*	Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

Sample Receipt Summary

07/09/2019

Prism Work Order: 9060372

Client Sample ID	Lab Sample ID	Matrix	Date/Time Sampled	Date/Time Received
B-68 (8.5-10, 13.5-15)	9060372-01	Solid	06/26/19 0:00	06/26/19 11:45
B-69 (13.5-15, 18.5-20)	9060372-02	Solid	06/26/19 0:00	06/26/19 11:45
B-73 (8.5-10, 13.5-15)	9060372-03	Solid	06/26/19 0:00	06/26/19 11:45
B-14 (S-3, 8.5-10), B-17 (S-5, 18.5-20)	9060372-04	Solid	06/26/19 0:00	06/26/19 11:45
B-18 (S-3, S-4)(8.5-10, 13.5-15)	9060372-05	Solid	06/26/19 0:00	06/26/19 11:45
B-15 (S-4, S-5)(13.5-15, 18.5-20)	9060372-06	Solid	06/26/19 0:00	06/26/19 11:45
B-16 (S-3, S-4)(8.5-10, 13.5-15)	9060372-07	Solid	06/26/19 0:00	06/26/19 11:45
B-43 (13.5-15, 18.5-20)	9060372-08	Solid	06/26/19 0:00	06/26/19 11:45
B-44, B-45 (13.5-15)	9060372-09	Solid	06/26/19 0:00	06/26/19 11:45
B-46 (0-1.5, 3.5-5)	9060372-10	Solid	06/26/19 0:00	06/26/19 11:45
B-48 (8.5-10, 13.5-15)	9060372-11	Solid	06/26/19 0:00	06/26/19 11:45
B-64 (8.5-10, 13.5-15)	9060372-12	Solid	06/26/19 0:00	06/26/19 11:45
B-66 (8.5-10, 13.5-15)	9060372-13	Solid	06/26/19 0:00	06/26/19 11:45

Samples were received at 23.5 degrees C. See case narrative for further information.

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-68 (8.5-10, 13.5-15)
Prism Sample ID: 9060372-01
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	33	9.4	1	*9056A	7/2/19 17:13	BMS	P9G0043
Sulfate	**480**	**mg/kg dry**	**200**	**57**	**1**	***9056A**	**7/2/19 17:13**	**BMS**	**P9G0043**
General Chemistry Parameters									
% Solids	**76.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**5.7**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**23.2**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-69 (13.5-15, 18.5-20)
Prism Sample ID: 9060372-02
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.8	1	*9056A	7/2/19 17:57	BMS	P9G0043
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	7/2/19 17:57	BMS	P9G0043
General Chemistry Parameters									
% Solids	**82.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**6.0**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**17.7**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-73 (8.5-10, 13.5-15)
Prism Sample ID: 9060372-03
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.8	1	*9056A	7/2/19 18:12	BMS	P9G0043
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	7/2/19 18:12	BMS	P9G0043
General Chemistry Parameters									
% Solids	**82.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**4.9**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**18.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-14 (S-3, 8.5-10), B-17 (S-5, 18.
Prism Sample ID: 9060372-04
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	35	10	1	*9056A	7/2/19 18:27	BMS	P9G0043
Sulfate	**520**	**mg/kg dry**	**210**	**62**	**1**	***9056A**	**7/2/19 18:27**	**BMS**	**P9G0043**
General Chemistry Parameters									
% Solids	**70.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**4.0**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**29.2**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-18 (S-3, S-4)(8.5-10, 13.5-15)
Prism Sample ID: 9060372-05
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.7	1	*9056A	7/2/19 18:42	BMS	P9G0043
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	7/2/19 18:42	BMS	P9G0043
General Chemistry Parameters									
% Solids	**82.7**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**4.4**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**17.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-15 (S-4, S-5)(13.5-15, 18.5-20)
Prism Sample ID: 9060372-06
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	31	8.8	1	*9056A	7/2/19 18:57	BMS	P9G0043
Sulfate	**220**	**mg/kg dry**	**180**	**54**	**1**	***9056A**	**7/2/19 18:57**	**BMS**	**P9G0043**
General Chemistry Parameters									
% Solids	**81.7**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**4.8**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**18.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-16 (S-3, S-4)(8.5-10, 13.5-15)
Prism Sample ID: 9060372-07
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.3	1	*9056A	7/2/19 19:11	BMS	P9G0043
Sulfate	**180**	**mg/kg dry**	**170**	**50**	**1**	***9056A**	**7/2/19 19:11**	**BMS**	**P9G0043**
General Chemistry Parameters									
% Solids	**87.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**
pH	**4.4**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**12.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/2/19 10:00**	**KBS**	**P9G0026**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-43 (13.5-15, 18.5-20)
Prism Sample ID: 9060372-08
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.3	1	*9056A	7/2/19 19:26	BMS	P9G0043
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	7/2/19 19:26	BMS	P9G0043
General Chemistry Parameters									
% Solids	**87.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**4.4**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**12.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-44, B-45 (13.5-15)
Prism Sample ID: 9060372-09
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.3	1	*9056A	7/2/19 19:41	BMS	P9G0043
Sulfate	**240**	**mg/kg dry**	**170**	**50**	**1**	***9056A**	**7/2/19 19:41**	**BMS**	**P9G0043**
General Chemistry Parameters									
% Solids	**86.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**4.1**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**13.2**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-46 (0-1.5, 3.5-5)
Prism Sample ID: 9060372-10
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	27	7.8	1	*9056A	7/2/19 19:56	BMS	P9G0043
Sulfate	BRL	mg/kg dry	160	47	1	*9056A	7/2/19 19:56	BMS	P9G0043
General Chemistry Parameters									
% Solids	**92.8**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**4.6**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**7.22**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-48 (8.5-10, 13.5-15)
Prism Sample ID: 9060372-11
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.2	1	*9056A	7/2/19 21:39	BMS	P9G0044
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	7/2/19 21:39	BMS	P9G0044
General Chemistry Parameters									
% Solids	**87.6**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**4.6**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**12.4**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-64 (8.5-10, 13.5-15)
Prism Sample ID: 9060372-12
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	7/2/19 21:54	BMS	P9G0044
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	7/2/19 21:54	BMS	P9G0044
General Chemistry Parameters									
% Solids	**83.9**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**5.1**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**16.1**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-66 (8.5-10, 13.5-15)
Prism Sample ID: 9060372-13
Prism Work Order: 9060372
Time Collected: 06/26/19 00:00
Time Submitted: 06/26/19 11:45

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.2	1	*9056A	7/2/19 22:09	BMS	P9G0044
Sulfate	BRL	mg/kg dry	170	50	1	*9056A	7/2/19 22:09	BMS	P9G0044
General Chemistry Parameters									
% Solids	**87.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**
pH	**5.0**	**pH Units**			**1**	***9045D**	**7/1/19 16:38**	**CBM**	**P9G0057**
% Moisture	**12.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/3/19 9:15**	**KBS**	**P9G0045**

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9060372
Time Submitted: 6/26/2019 11:45:00AM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0043 - Default Prep GenChem										
Blank (P9G0043-BLK1)				Prepared & Analyzed: 07/02/19						
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9G0043-BS1)				Prepared & Analyzed: 07/02/19						
Chloride	1010	25	mg/kg wet	1000		101	80-120			
Sulfate	1050	150	mg/kg wet	1000		105	80-120			
Matrix Spike (P9G0043-MS1)		**Source: 9060372-10**		Prepared & Analyzed: 07/02/19						
Chloride	1120	27	mg/kg dry	1078	BRL	104	80-120			
Sulfate	1210	160	mg/kg dry	1078	82.4	105	80-120			
Matrix Spike Dup (P9G0043-MSD1)		**Source: 9060372-10**		Prepared & Analyzed: 07/02/19						
Chloride	1110	27	mg/kg dry	1078	BRL	103	80-120	1	15	
Sulfate	1210	160	mg/kg dry	1078	82.4	104	80-120	0.4	15	
Batch P9G0044 - Default Prep GenChem										
Blank (P9G0044-BLK1)				Prepared & Analyzed: 07/02/19						
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9G0044-BS1)				Prepared & Analyzed: 07/02/19						
Chloride	997	25	mg/kg wet	1000		100	80-120			
Sulfate	1040	150	mg/kg wet	1000		104	80-120			
Matrix Spike (P9G0044-MS1)		**Source: 9060372-13**		Prepared & Analyzed: 07/02/19						
Chloride	1100	29	mg/kg dry	1142	BRL	97	80-120			
Sulfate	1230	170	mg/kg dry	1142	69.6	102	80-120			

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9060372
Time Submitted: 6/26/2019 11:45:00AM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0044 - Default Prep GenChem										
Matrix Spike Dup (P9G0044-MSD1)		**Source: 9060372-13**		Prepared & Analyzed: 07/02/19						
Chloride	1180	29	mg/kg dry	1142	BRL	103	80-120	7	15	
Sulfate	1300	170	mg/kg dry	1142	69.6	108	80-120	6	15	

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9060372
Time Submitted: 6/26/2019 11:45:00AM

General Chemistry Parameters - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0026 - NO PREP										
Duplicate (P9G0026-DUP2)		**Source: 9060372-02**		Prepared: 07/01/19 Analyzed: 07/02/19						
% Solids	81.3	0.100	% by Weight		82.3			1	20	
% Moisture	18.7	0.100	% by Weight		17.7			6	20	
Batch P9G0045 - NO PREP										
Duplicate (P9G0045-DUP1)		**Source: 9060372-10**		Prepared: 07/02/19 Analyzed: 07/03/19						
% Solids	93.0	0.100	% by Weight		92.8			0.2	20	
% Moisture	7.00	0.100	% by Weight		7.22			3	20	
Batch P9G0057 - NO PREP										
LCS (P9G0057-BS1)				Prepared & Analyzed: 07/01/19						
pH	6.84		pH Units	6.880		99.4	98.5-101.5			
Duplicate (P9G0057-DUP1)		**Source: 9060372-03**		Prepared & Analyzed: 07/01/19						
pH	4.83		pH Units		4.87			0.825	20	
Duplicate (P9G0057-DUP2)		**Source: 9060372-13**		Prepared & Analyzed: 07/01/19						
pH	5.05		pH Units		5.03			0.397	20	

Sample Extraction Data

Prep Method: Default Prep GenChem

Lab Number	Batch	Initial	Final	Date/Time
9060372-01	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-02	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-03	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-04	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-05	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-06	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-07	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-08	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-09	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-10	P9G0043	5 g	50 mL	07/02/19 9:44
9060372-11	P9G0044	5 g	50 mL	07/02/19 9:44
9060372-12	P9G0044	5 g	50 mL	07/02/19 9:44
9060372-13	P9G0044	5 g	50 mL	07/02/19 9:44

Subcontracted Analyses

The following analyses were subcontracted to Analytical Environmental Services, Inc.

Lab Number	Analysis
9060372-01	Resistivity (Sub)
9060372-01	Sulfide (Sub)
9060372-02	Resistivity (Sub)
9060372-02	Sulfide (Sub)
9060372-03	Resistivity (Sub)
9060372-03	Sulfide (Sub)
9060372-04	Resistivity (Sub)
9060372-04	Sulfide (Sub)
9060372-05	Resistivity (Sub)
9060372-05	Sulfide (Sub)
9060372-06	Resistivity (Sub)
9060372-06	Sulfide (Sub)
9060372-07	Resistivity (Sub)
9060372-07	Sulfide (Sub)
9060372-08	Resistivity (Sub)
9060372-08	Sulfide (Sub)
9060372-09	Resistivity (Sub)
9060372-09	Sulfide (Sub)
9060372-10	Resistivity (Sub)
9060372-10	Sulfide (Sub)
9060372-11	Resistivity (Sub)
9060372-11	Sulfide (Sub)
9060372-12	Resistivity (Sub)
9060372-12	Sulfide (Sub)
9060372-13	Resistivity (Sub)
9060372-13	Sulfide (Sub)

The following analyses were subcontracted to Gulf Coast Analytical Labs, Inc.

Lab Number	Analysis
9060372-01	ORP (Sub)
9060372-02	ORP (Sub)
9060372-03	ORP (Sub)
9060372-04	ORP (Sub)
9060372-05	ORP (Sub)
9060372-06	ORP (Sub)
9060372-07	ORP (Sub)
9060372-08	ORP (Sub)
9060372-09	ORP (Sub)
9060372-10	ORP (Sub)
9060372-11	ORP (Sub)
9060372-12	ORP (Sub)
9060372-13	ORP (Sub)

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

IRT-13

CHAIN OF CUSTODY RECORD

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: _____

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310 HUBERT STREET, RALEIGH, NC, 27603
Phone: 919-719-1845 Fax (Yes) (No): _____
Email (Yes) (No) Email Address MKAYSER@FandR.com
EDD Type: ___ PDF ✓ Excel ___ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: Various

Project Name: FAYPWC BIG ROCKFISH CREEK OUTFALL
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT ~~ABI~~ STREET

Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival? 23.4	✓		
Received ON WET ICE? Temp 23.5		✓	
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			✓
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ___ USACE ___ FL ___ NC ___
SC ___ OTHER ___ N/A ___
Water Chlorinated: YES ___ NO ___
Sample Iced Upon Collection: YES ___ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	pH	Chloride	Sulfate	Electrical Resistivity	Red ox	Sulfides	REMARKS	PRISM LAB ID NO.
B-14 (5-3, 8.5-10) B-17 (5-5, 18.5-20)			SOIL	G												04
B-18 (5-3, 5-4) (8.5-10, 13.5-15)			SOIL	G												05
B-15 (5-4, 5-5) (13.5-15, 18.5-20)																06
B-16 (5-3, 5-4) (8.5-10, 13.5-15)																07
B-43 (13.5-15) (18.5-20)																08
B-44 (13.5-15) B-45 (13.5-15)																09
B-46 (0-1.5 3.5-5)																10
B-48 (8.5-10) (13.5-15)																11
B-64 (8.5-10) (13.5-15)																12
B-66 (8.5-10 13.5-15)																13

Sampler's Signature F.A. KAYSER Sampled By (Print Name) MOHAMMAD KAYSER Affiliation _____

PRESS DOWN FIRMLY - 3 COPIES

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	06-25-19	12:17
Relinquished By: (Signature)	Received By: (Signature)	6/26/19	1125
Relinquished By: (Signature)	Received For Prism Laboratories By:	6/26/19	1145

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other _____

Log-in Group No. 9060372

Additional Comments: LO Composite test

PRISM USE ONLY

Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____	☐ NC ☐ SC ☐ _____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

IRT-13

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: _____

Project Name: FAYPWC BIG ROCKFISH CREEK OUTFALL

Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)

*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements

Invoice To: F&R

Address: 310 HUBERT ~~ADI~~ STREET

Client Company Name: F&R

Report To/Contact Name: MOHAMMAD KAYSER

Reporting Address: 310 HUBERT STREET, RALEIGH, NC, 27603

Phone: 919-719-1845 Fax (Yes) (No): _____

Email (Yes) (No) Email Address MKAYSER@FandR.com

EDD Type: ___ PDF ✓ Excel ___ Other

Site Location Name: FAYETTVILLE

Site Location Physical Address: Various

Purchase Order No./Billing Reference 66W-0027

Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days

"Working Days" ☐ 6-9 Days ☑ Standard 10 days

Samples received after 15:00 will be processed next business day.

Turnaround time is based on business days, excluding weekends and holidays.

(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival? 23.4			
Received ON WET ICE? Temp 23.5		✓	
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			✓
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ___ USACE ___ FL ___ NC ___

SC ___ OTHER ___ N/A ___

Water Chlorinated: YES ___ NO ___

Sample Iced Upon Collection: YES ___ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	pH	Chloride	Sulfate	Electrical Resistivity	Red ox	Sulfides	REMARKS	PRISM LAB ID NO.
B-68 (8.5-10) (13.5-15)			SOIL	G				↓	↓	↓	↓	↓	↓	↓		01
B-69 (13.5-15) (18.5-20)			SOIL	G												02
B-73 (8.5-10) (13.5-15)			"	"												03

PRESS DOWN FIRMLY - 3 COPIES

Sampler's Signature F.A. KAYSER Sampled By (Print Name) MOHAMMAD KAYSER Affiliation _____

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

Relinquished By: (Signature)	Received By: (Signature)	Date	Military/Hours
F.A. KAYSER	Philip Pinje	06-25-19	12:17
Philip Pinje		6/26/19	1125
	Received For Prism Laboratories By:	Date: 6/26/19	1145

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☒ Other COURIER EXP

Log-in Group No. 9060372

Additional Comments: 3 Composite test

PRISM USE ONLY

Site Arrival Time:

Site Departure Time:

Field Tech Fee:

Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___	☐ NC ☐ SC ☐ ___

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT

Prism Laboratories
PO Box 240543
Charlotte NC 282240543

ATTENTION
Angela Overcash

PROJECT ID
9060372

LABORATORY REPORT NUMBER
1906U15

DATE
July 08, 2019

Primary Data Review By

Chris Pafford
Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.**
- **AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582**
- **AIHA-LAP,LLC Laboratory ID:100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.**
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll fee at 883.315.4243

9060372

PRISM LABORATORIES INC | Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060372

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Analytical Environmental Services, Inc.
3080 Presidential Parkway
Atlanta, GA 30340
Phone :(770) 457-8177
Fax: NA

5 day TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060372-01	**Solid**	**Sampled:06/26/19 00:00**	B-68	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9060372-02	**Solid**	**Sampled:06/26/19 00:00**	B-69	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060372-03	**Solid**	**Sampled:06/26/19 00:00**	B-73	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060372-04	**Solid**	**Sampled:06/26/19 00:00**	B-14	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				

Released By: Fedex	Date: 6-27-19	Received By: Fedex	Date:
Released By:	Date:	Received By:	Date: 939 6/28/19
Released By:	Date:	Received By:	Date:
Released By:	Date:	Received By:	Date:

1906415

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060372

Certification: NELAC___ USACE___
NC___ SC___ Other_____
N/A____

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060372-05	**Solid**	**Sampled:06/26/19 00:00**	B-18	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9060372-06	**Solid**	**Sampled:06/26/19 00:00**	B-15	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
Sample ID: 9060372-07	**Solid**	**Sampled:06/26/19 00:00**	B-16	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
Sample ID: 9060372-08	**Solid**	**Sampled:06/26/19 00:00**	B-43	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060372-09	**Solid**	**Sampled:06/26/19 00:00**	B-44	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060372-10	**Solid**	**Sampled:06/26/19 00:00**	B-46	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
Fedex	6.27.19	Fedex	
Released By	Date	Received By	Date
			6/28/19 939
Released By	Date	Received By	Date
Released By	Date	Received By	Date

1906415

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060372

Certification: NELAC___ USACE___
NC___ SC___ Other___
N/A___

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060372-11	**Solid**	**Sampled:06/26/19 00:00**	B-48	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9060372-12	**Solid**	**Sampled:06/26/19 00:00**	B-64	
Resistivity (Sub)		07/24/19 00:00		
Sulfide (Sub)		07/03/19 00:00		
Containers Supplied:				
Sample ID: 9060372-13	**Solid**	**Sampled:06/26/19 00:00**	B-66	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
1				

Released By	Date	Received By	Date
Jalon Y Fedex	6-27-19	Fedex	
Released By	Date	Received By	Date
			6/28/19 939
Released By	Date	Received By	Date
Released By	Date	Received By	Date

Analytical Environmental Services, Inc

Date: 8-Jul-19

Client: Prism Laboratories
Project: 9060372
Lab ID: 1906U15

Case Narrative

Sample Receiving Nonconformance:

Sample information on the Chain of Custody (COC) did not match that on the sample bottle labels. 1906U15-001 listed as "B-68" on the COC was labeled "B-68 (8.5, 13.5-15)". Sample was logged in per COC.

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-68
Lab Order	1906U15	**Tag Number:**	9060372-01
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-001A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		42.6	50.7	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	6710		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	24.1		0	0	wt%	R401788	1	07/01/2019 00:00	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-69
Lab Order	1906U15	**Tag Number:**	9060372-02
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-002A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		40.8	48.6	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	15200		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	20.0		0	0	wt%	R401788	1	07/01/2019 00:00	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-73
Lab Order	1906U15	**Tag Number:**	9060372-03
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-003A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		42.0	50.0	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	14300		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	22.3		0	0	wt%	R401788	1	07/01/2019 00:00	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-14
Lab Order	1906U15	**Tag Number:**	9060372-04
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-004A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		44.9	53.5	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	4630		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	28.8		0	0	wt%	R401788	1	07/01/2019 00:00	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-18
Lab Order	1906U15	**Tag Number:**	9060372-05
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-005A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		38.4	45.7	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	17100		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	16.7		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-15
Lab Order	1906U15	**Tag Number:**	9060372-06
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-006A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		37.7	44.9	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	12900		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	15.1		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-16
Lab Order	1906U15	**Tag Number:**	9060372-07
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-007A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		36.9	44.0	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	11100		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	11.7		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-43
Lab Order	1906U15	**Tag Number:**	9060372-08
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-008A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		37.3	44.4	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	16800		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	14.2		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-44
Lab Order	1906U15	**Tag Number:**	9060372-09
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-009A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		37.1	44.2	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	14800		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	12.2		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-46
Lab Order	1906U15	**Tag Number:**	9060372-10
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-010A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		36.0	42.8	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	11500		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	6.64		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc Date: 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-48
Lab Order	1906U15	**Tag Number:**	9060372-11
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-011A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		38.1	45.4	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	15100		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	12.8		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-64
Lab Order	1906U15	**Tag Number:**	9060372-12
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-012A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		39.5	47.0	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	14100		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	18.9		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc Date: 8-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-66
Lab Order	1906U15	**Tag Number:**	9060372-13
Project Name:	9060372	**Collection Date:**	6/26/2019
Lab ID:	1906U15-013A	**Matrix:**	Soil

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL		38.5	45.8	mg/Kg-dry	281552	1	07/02/2019 09:30	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	15300		0	0	ohms*cm	281487	1	06/28/2019 14:30	BK
PERCENT MOISTURE D2216									
Percent Moisture	13.5		0	0	wt%	R401807	1	07/02/2019 09:06	SB

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Clear Save as

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

SAMPLE/COOLER RECEIPT CHECKLIST

1. Client Name: Access Analytical, Inc. AES Work Order Number: 1906U15

2. Carrier: FedEx ■ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other _____

		Yes	No	N/A	Details	Comments
3.	Shipping container/cooler received in good condition?	◉	○	○	damaged ☐ leaking ☐ other ☐	
4.	Custody seals present on shipping container?	○	◉	○		
5.	Custody seals intact on shipping container?	○	○	◉		
6.	Temperature blanks present?	○	◉	○		
7.	Cooler temperature(s) within limits of 0-6°C? [See item 13 and 14 for temperature recordings.]	◉	○	○	Cooling initiated for recently collected samples / ice present ☐	
8.	Chain of Custody (COC) present?	◉	○	○		
9.	Chain of Custody signed, dated, and timed when relinquished and received?	◉	○	○		
10.	Sampler name and/or signature on COC?	○	◉	○		
11.	Were all samples received within holding time?	◉	○	○		
12.	TAT marked on the COC?	◉	○	○	If no TAT indicated, proceeded with standard TAT per Terms & Conditions. ☐	

13. Cooler 1 Temperature 2.9 °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C

14. Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

15. Comments: _____

I certify that I have completed sections 1-15 (dated initials). MH 6/28/19

		Yes	No	N/A	Details	Comments
16.	Were sample containers intact upon receipt?	◉	○	○		
17.	Custody seals present on sample containers?	○	◉	○		
18.	Custody seals intact on sample containers?	○	○	◉		
19.	Do sample container labels match the COC?	○	◉	○	incomplete info ☐ illegible ☐ no label ☐ other ■	
20.	Are analyses requested indicated on the COC?	◉	○	○		
21.	Were all of the samples listed on the COC received?	◉	○	○	samples received but not listed on COC ☐ samples listed on COC not received ☐	
22.	Was the sample collection date/time noted?	◉	○	○		
23.	Did we receive sufficient sample volume for indicated analyses?	◉	○	○		
24.	Were samples received in appropriate containers?	◉	○	○		
25.	Were VOA samples received without headspace (< 1/4" bubble)?	○	○	◉		
26.	Were trip blanks submitted?	○	○	◉	listed on COC ☐ not listed on COC ☐	

27. Comments: _____

This section only applies to samples where pH can be checked at Sample Receipt.

I certify that I have completed sections 16-27 (dated initials). MH 6/28/19

		Yes	No	N/A	Details	Comments
28.	Have containers needing chemical preservation been checked? *	○	○	◉		
29.	Containers meet preservation guidelines?	○	○	◉		
30.	Was pH adjusted at Sample Receipt?	○	○	◉		

* Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH.

I certify that I have completed sections 28-30 (dated initials). MH 6/28/19

Checklist 6.9.17 Rev 2

Locked

Client: Prism Laboratories
Project Name: 9060372
Lab Order: 1906U15

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1906U15-001A	B-68	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-001A	B-68	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-001A	B-68	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/01/2019
1906U15-002A	B-69	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-002A	B-69	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-002A	B-69	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/01/2019
1906U15-003A	B-73	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-003A	B-73	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-003A	B-73	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/01/2019
1906U15-004A	B-14	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-004A	B-14	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-004A	B-14	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/01/2019
1906U15-005A	B-18	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-005A	B-18	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-005A	B-18	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-006A	B-15	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-006A	B-15	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-006A	B-15	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-007A	B-16	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-007A	B-16	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-007A	B-16	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-008A	B-43	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-008A	B-43	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-008A	B-43	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-009A	B-44	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-009A	B-44	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-009A	B-44	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-010A	B-46	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-010A	B-46	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019

Analytical Environmental Services, Inc

Date: 8-Jul-19

Client: Prism Laboratories
Project Name: 9060372
Lab Order: 1906U15

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1906U15-010A	B-46	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-011A	B-48	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-011A	B-48	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-011A	B-48	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-012A	B-64	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-012A	B-64	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-012A	B-64	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019
1906U15-013A	B-66	6/26/2019 12:00:00AM	Soil	Sulfide		7/2/2019 9:30:00 AM	07/02/2019
1906U15-013A	B-66	6/26/2019 12:00:00AM	Soil	Soil Resistivity		6/28/2019 2:30:41 PM	06/28/2019
1906U15-013A	B-66	6/26/2019 12:00:00AM	Soil	PERCENT MOISTURE			07/02/2019

Client: Prism Laboratories
Project Name: 9060372
Workorder: 1906U15

ANALYTICAL QC SUMMARY REPORT

BatchID: 281487

Sample ID: **LCS-281487**	Client ID:				Units: **ohms*cm**	Prep Date: **06/28/2019**	Run No: **401773**
SampleType: **LCS**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281487**	Analysis Date: **06/28/2019**	Seq No: **9015855**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	10490	0	10000		105	90	110				

Sample ID: **1906U15-001ADUP**	Client ID: **B-68**				Units: **ohms*cm**	Prep Date: **06/28/2019**	Run No: **401773**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281487**	Analysis Date: **06/28/2019**	Seq No: **9015869**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	6720	0						6711	0.134	30	

Sample ID: **1906U15-011ADUP**	Client ID: **B-48**				Units: **ohms*cm**	Prep Date: **06/28/2019**	Run No: **401773**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281487**	Analysis Date: **06/28/2019**	Seq No: **9015870**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	15130	0						15080	0.302	30	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: Prism Laboratories
Project Name: 9060372
Workorder: 1906U15

ANALYTICAL QC SUMMARY REPORT

BatchID: 281552

Sample ID: **MB-281552**	Client ID:					Units: **mg/Kg**		Prep Date: **07/02/2019**		Run No: **401959**	
SampleType: **MBLK**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **281552**		Analysis Date: **07/03/2019**		Seq No: **9020949**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	BRL	40.0									

Sample ID: **LCS-281552**	Client ID:					Units: **mg/Kg**		Prep Date: **07/02/2019**		Run No: **401959**	
SampleType: **LCS**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **281552**		Analysis Date: **07/02/2019**		Seq No: **9020963**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1400	40.0	1400		100	70	130				

Sample ID: **1906U15-001AMS**	Client ID: **B-68**					Units: **mg/Kg-dry**		Prep Date: **07/02/2019**		Run No: **401959**	
SampleType: **MS**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **281552**		Analysis Date: **07/02/2019**		Seq No: **9020966**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1550	52.2	1827		84.9	68.9	122				

Sample ID: **1906U15-001AMSD**	Client ID: **B-68**					Units: **mg/Kg-dry**		Prep Date: **07/02/2019**		Run No: **401959**	
SampleType: **MSD**	TestCode: **Sulfide by SW9030B/9034**					BatchID: **281552**		Analysis Date: **07/02/2019**		Seq No: **9020967**	
Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1554	50.2	1757		88.4	68.9	122	1550	0.237	20	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Prism Laboratories, Inc.
PO BOX 240543
Charlotte, NC 28224

ATTENTION
Angela Overcash

PROJECT ID
9060372

LABORATORY REPORT NUMBER
219062810

DATE
07/05/2019

Primary Data Review By

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 Innovation Park Dr., Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 07/05/2019

GCAL Report 219062810

Project 9060372

Deliver To	*Additional Recipients*
Angela Overcash Prism Laboratories, Inc. PO BOX 240543 Charlotte, NC 28224 706-529-6364	NONE

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL Report 219062810

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: Access Analytical **Report:** 219062810

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21906281001	B-68	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281002	B-69	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281003	B-73	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281004	B-14	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281005	B-18	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281006	B-15	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281007	B-16	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281008	B-43	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281009	B-44	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281010	B-46	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281011	B-48	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281012	B-64	Solid	06/26/2019 00:01	06/28/2019 09:35
21906281013	B-66	Solid	06/26/2019 00:01	06/28/2019 09:35

Summary of Compounds Detected

B-68

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281001
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	454			mV

B-69

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281002
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	409			mV

B-73

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281003
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	435			mV

B-14

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281004
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	471			mV

Summary of Compounds Detected

B-18

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281005
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	425			mV

B-15

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281006
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	431			mV

B-16

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281007
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	452			mV

B-43

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281008
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	426			mV

Summary of Compounds Detected

B-44

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281009
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	461			mV

B-46

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281010
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	437			mV

B-48

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281011
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	426			mV

B-64

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281012
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	434			mV

Summary of Compounds Detected

B-66	**Collect Date**	06/26/2019 00:01	**GCAL ID**	21906281013
	Receive Date	06/28/2019 09:35	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	413			mV

Sample Results

B-68

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281001
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	454			mV

B-69

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281002
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	409			mV

B-73

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281003
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	435			mV

B-14

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281004
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	471			mV

Sample Results

B-18

Collect Date	06/26/2019 00:01	GCAL ID	21906281005
Receive Date	06/28/2019 09:35	Matrix	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	425			mV

B-15

Collect Date	06/26/2019 00:01	GCAL ID	21906281006
Receive Date	06/28/2019 09:35	Matrix	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	431			mV

B-16

Collect Date	06/26/2019 00:01	GCAL ID	21906281007
Receive Date	06/28/2019 09:35	Matrix	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	452			mV

Sample Results

B-43

Collect Date	06/26/2019 00:01	**GCAL ID**	21906281008
Receive Date	06/28/2019 09:35	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	426			mV

B-44

Collect Date	06/26/2019 00:01	**GCAL ID**	21906281009
Receive Date	06/28/2019 09:35	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	461			mV

B-46

Collect Date	06/26/2019 00:01	**GCAL ID**	21906281010
Receive Date	06/28/2019 09:35	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	437			mV

Sample Results

B-48

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281011
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	426			mV

B-64

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281012
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	434			mV

B-66

Collect Date 06/26/2019 00:01 **GCAL ID** 21906281013
Receive Date 06/28/2019 09:35 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/05/2019 14:36	AJE	663238

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	413			mV

Client ID: 4565 - Access Analytical

SDG: 219062810

PM: DLH

PRISM Full-Service Analytical & Environmental Solutions

0.2°C E34 43EPM
#7755-8835-3940

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9060372

Certification: NELAC___ USACE___
NC___ SC___ Other ___
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Gulf Coast Analytical Labs, Inc.
10781 Coursey Blvd
Baton Rouge, LA 70816
Phone :(225) 769-4900
Fax: (225) 767-5717

5 day TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060372-01	**Solid**	**Sampled:06/26/19 00:00**	B-68	-1
ORP (Sub)		07/01/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9060372-02	**Solid**	**Sampled:06/26/19 00:00**	B-69	-2
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-03	**Solid**	**Sampled:06/26/19 00:00**	B-73	-3
ORP (Sub)		07/01/19 00:00		
Containers Supplied				
Sample ID: 9060372-04	**Solid**	**Sampled:06/26/19 00:00**	B-14	-4
ORP (Sub)		07/01/19 00:00		
Containers Supplied				
Sample ID: 9060372-05	**Solid**	**Sampled:06/26/19 00:00**	B-18	-5
ORP (Sub)		07/01/19 00:00		

Released By	Date	Received By	Date
Fedex	6-27-19	Fedex	
Fedex	6-28-19	[signature]	6-28-19 0935

SUBCONTRACT ORI
Prism Laboratories, I
9060372

Client ID: 4565 - Access Analytical
SDG: 219062810
PM: DLH

#7755-
0.2°C E34 43CBM 8535-3940

Analysis	Due	Expires	Laboratory ID	Comments
Containers Supplied:				
Sample ID: 9060372-06	Solid	Sampled:06/26/19 00:00	B-15	-6
ORP (Sub)		07/01/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9060372-07	Solid	Sampled:06/26/19 00:00	B-16	-7
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-08	Solid	Sampled:06/26/19 00:00	B-43	-8
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-09	Solid	Sampled:06/26/19 00:00	B-44	-9
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-10	Solid	Sampled:06/26/19 00:00	B-46	-10
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-11	Solid	Sampled:06/26/19 00:00	B-48	-11
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9060372-12	Solid	Sampled:06/26/19 00:00	B-64	-12
ORP (Sub)		07/01/19 00:00		
Containers Supplied				

Released By	Date	Received By	Date
Fedex	6-27-19	Fedex	
Fedex	6-28-19		6-28-19 0935

Client ID: 4565 - Access Analytical

SDG: 219062810

PM: DLH

CONTRACT ORDER

ism Laboratories, Inc.

9060372

Certification: NELAC__ USACE__
NC__ SC__ Other__
N/A__

0.2°C E3443CRM #7755-8835-3940

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9060372-13	Solid	Sampled:06/26/19 00:00	B-66	-13
ORP (Sub)		07/01/19 00:00		

Containers Supplied:

1x 4oz jar

Released By	Date	Received By	Date
Jalen Uf	6.27.19	Fedex	
Fedex	6-28-19	Tiffany Jun	6-28-19 0935

SAMPLE RECEIVING CHECKLIST

219062810

SAMPLE DELIVERY GROUP 219062810	
Client PM DLH 4565 - Access Analytical	**Transport Method** FEDEX
Profile Number 80251	**Received By** Savage, Tiffany R
Line Item(s) 2 - Solid	**Receive Date(s)** 06/28/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by GCAL?	☐	☑

COOLERS

Airbill	Thermometer ID: E34	Temp °C
7755-8835-3940		0.2

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.6

PRISM LABORATORIES, INC.
Full-Service Analytical & Environmental Solutions

NC Certification No. 402
NC Drinking Water Cert No. 37735
SC Certification No. 99012

Case Narrative

7/23/19 11:09

Froehling & Robertson, Inc. (Raleigh)
Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Lab Submittal Date: 07/05/2019
Prism Work Order: 9070076

This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

Narrative Notes:

ORP analysis was subcontracted to GCAL. Resistivity and Sulfide was subcontracted to AES.
Laboratory reports are attached.

Prism Summary of Detections does not include subcontracted data.

Please call if you have any questions relating to this analytical report.

Respectfully,

PRISM LABORATORIES, INC.

DRAFT REPORT

DATA SUBJECT TO CHANGE

Reviewed By DRAFT REPORT

VP Laboratory Services

Data Qualifiers Key Reference:

HA	Sample analyzed outside of hold time.
HT	Sample received and analyzed outside of the hold time.
BRL	Below Reporting Limit
MDL	Method Detection Limit
RPD	Relative Percent Difference
*	Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Sample Receipt Summary

07/23/2019

Prism Work Order: 9070076

Client Sample ID	Lab Sample ID	Matrix	Date/Time Sampled	Date/Time Received
B-2(S-4,13.5'-15')/B-13(S-4,13-5'-15')	9070076-01	Solid	06/06/19 0:00	07/05/19 13:40
B-3(13.5'-15',18-5'-20')	9070076-03	Solid	06/05/19 0:00	07/05/19 13:40
B-10(8.5'-10',13.5'-15')	9070076-04	Solid	06/06/19 0:00	07/05/19 13:40
B-11(3.5'-5',8.5'-10')	9070076-05	Solid	06/25/19 0:00	07/05/19 13:40
B-34(8.5'-10',13.5'-15')	9070076-06	Solid	06/27/19 0:00	07/05/19 13:40
B-53(3.5'-5',8.5'-10')	9070076-07	Solid	06/26/19 0:00	07/05/19 13:40
B-54(8.5'-10',13.5'-15')	9070076-08	Solid	06/26/19 0:00	07/05/19 13:40
B-55(8.5'-10',13.5'-15')	9070076-09	Solid	06/26/19 0:00	07/05/19 13:40
B-74(8.5'-10',13.5'-15')	9070076-10	Solid	06/24/19 0:00	07/05/19 13:40
B-77(18.5'-20',23.5'-25')	9070076-12	Solid	06/25/19 0:00	07/05/19 13:40
B-78(13.5'-15',18-5'-20')	9070076-13	Solid	06/25/19 0:00	07/05/19 13:40
B-79(8.5'-10',13.5'-15')	9070076-14	Solid	06/25/19 0:00	07/05/19 13:40

Samples were received in good condition at 2.6 degrees C unless otherwise noted.

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PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-2(S-4,13.5'-15')/B-13(S-4,13-5'-
Prism Sample ID: 9070076-01
Prism Work Order: 9070076
Time Collected: 06/06/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL HA	mg/kg dry	30	8.6	1	*9056A	7/12/19 17:52	BMS	P9G0169
Sulfate	**300 HA**	**mg/kg dry**	**180**	**52**	**1**	***9056A**	**7/12/19 17:52**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**84.4 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.0**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**15.6 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-3(13.5'-15',18-5'-20')
Prism Sample ID: 9070076-03
Prism Work Order: 9070076
Time Collected: 06/05/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL HA	mg/kg dry	29	8.4	1	*9056A	7/12/19 18:07	BMS	P9G0169
Sulfate	**310 HA**	**mg/kg dry**	**170**	**51**	**1**	***9056A**	**7/12/19 18:07**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**86.4 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.3**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.4 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-10(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-04
Prism Work Order: 9070076
Time Collected: 06/06/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL HA	mg/kg dry	29	8.5	1	*9056A	7/12/19 18:21	BMS	P9G0169
Sulfate	**320 HA**	**mg/kg dry**	**180**	**51**	**1**	***9056A**	**7/12/19 18:21**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**85.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.0**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**14.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-11(3.5'-5',8.5'-10')
Prism Sample ID: 9070076-05
Prism Work Order: 9070076
Time Collected: 06/25/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	29	8.4	1	*9056A	7/12/19 18:36	BMS	P9G0169
Sulfate	**220**	**mg/kg dry**	**180**	**51**	**1**	***9056A**	**7/12/19 18:36**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**85.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.1**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**14.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-34(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-06
Prism Work Order: 9070076
Time Collected: 06/27/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	7/12/19 18:51	BMS	P9G0169
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	7/12/19 18:51	BMS	P9G0169
General Chemistry Parameters									
% Solids	**83.6**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**5.2**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.4**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-53(3.5'-5',8.5'-10')
Prism Sample ID: 9070076-07
Prism Work Order: 9070076
Time Collected: 06/26/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	7/12/19 19:06	BMS	P9G0169
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	7/12/19 19:06	BMS	P9G0169
General Chemistry Parameters									
% Solids	**83.7**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.4**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.3**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-54(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-08
Prism Work Order: 9070076
Time Collected: 06/26/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	7/12/19 19:21	BMS	P9G0169
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	7/12/19 19:21	BMS	P9G0169
General Chemistry Parameters									
% Solids	**83.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.7**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.5**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-55(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-09
Prism Work Order: 9070076
Time Collected: 06/26/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.6	1	*9056A	7/12/19 19:35	BMS	P9G0169
Sulfate	BRL	mg/kg dry	180	52	1	*9056A	7/12/19 19:35	BMS	P9G0169
General Chemistry Parameters									
% Solids	**84.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.5**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.0**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-74(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-10
Prism Work Order: 9070076
Time Collected: 06/24/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	31	9.0	1	*9056A	7/12/19 20:20	BMS	P9G0169
Sulfate	BRL	mg/kg dry	190	54	1	*9056A	7/12/19 20:20	BMS	P9G0169
General Chemistry Parameters									
% Solids	**80.6 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.5**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**19.4 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-77(18.5'-20',23.5'-25')
Prism Sample ID: 9070076-12
Prism Work Order: 9070076
Time Collected: 06/25/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	32	9.3	1	*9056A	7/12/19 21:04	BMS	P9G0169
Sulfate	**570**	**mg/kg dry**	**190**	**56**	**1**	***9056A**	**7/12/19 21:04**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**77.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**3.6**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**22.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-78(13.5'-15',18-5'-20')
Prism Sample ID: 9070076-13
Prism Work Order: 9070076
Time Collected: 06/25/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.7	1	*9056A	7/12/19 21:49	BMS	P9G0170
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	7/12/19 21:49	BMS	P9G0170
General Chemistry Parameters									
% Solids	**83.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**5.3**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-79(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-14
Prism Work Order: 9070076
Time Collected: 06/25/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL	mg/kg dry	30	8.7	1	*9056A	7/12/19 22:33	BMS	P9G0170
Sulfate	BRL	mg/kg dry	180	53	1	*9056A	7/12/19 22:33	BMS	P9G0170
General Chemistry Parameters									
% Solids	**83.3 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.9**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**16.7 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9070076
Time Submitted: 7/5/2019 1:40:00PM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0169 - Default Prep GenChem										
Blank (P9G0169-BLK1)				Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9G0169-BS1)				Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1000	25	mg/kg wet	1000		100	80-120			
Sulfate	1030	150	mg/kg wet	1000		103	80-120			
Matrix Spike (P9G0169-MS1)	**Source: 9070076-10**			Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1280	31	mg/kg dry	1240	BRL	103	80-120			
Sulfate	1410	190	mg/kg dry	1240	173	100	80-120			
Matrix Spike Dup (P9G0169-MSD1)	**Source: 9070076-10**			Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1270	31	mg/kg dry	1240	BRL	103	80-120	0.2	15	
Sulfate	1420	190	mg/kg dry	1240	173	100	80-120	0.4	15	
Batch P9G0170 - Default Prep GenChem										
Blank (P9G0170-BLK1)				Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	BRL	25	mg/kg wet							
Sulfate	BRL	150	mg/kg wet							
LCS (P9G0170-BS1)				Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1000	25	mg/kg wet	1000		100	80-120			
Sulfate	1050	150	mg/kg wet	1000		105	80-120			
Matrix Spike (P9G0170-MS1)	**Source: 9070076-13**			Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1250	30	mg/kg dry	1203	BRL	104	80-120			
Sulfate	1340	180	mg/kg dry	1203	BRL	112	80-120			

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9070076
Time Submitted: 7/5/2019 1:40:00PM

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0170 - Default Prep GenChem										
Matrix Spike Dup (P9G0170-MSD1)		**Source: 9070076-13**		Prepared: 07/11/19	Analyzed: 07/12/19					
Chloride	1250	30	mg/kg dry	1203	BRL	104	80-120	0.2	15	
Sulfate	1350	180	mg/kg dry	1203	BRL	112	80-120	0.3	15	

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Prism Work Order: 9070076
Time Submitted: 7/5/2019 1:40:00PM

General Chemistry Parameters - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch P9G0138 - NO PREP										
LCS (P9G0138-BS1)				Prepared & Analyzed: 07/09/19						
pH	6.83		pH Units	6.880		99.3	98.5-101.5			
Duplicate (P9G0138-DUP1)		**Source: 9070076-03**		Prepared & Analyzed: 07/09/19						
pH	4.36		pH Units		4.34			0.460	20	
Duplicate (P9G0138-DUP2)		**Source: 9070076-13**		Prepared & Analyzed: 07/09/19						
pH	5.33		pH Units		5.30			0.564	20	
Batch P9G0141 - NO PREP										
Duplicate (P9G0141-DUP2)		**Source: 9070076-05**		Prepared: 07/09/19 Analyzed: 07/10/19						
% Solids	85.8	0.100	% by Weight		85.7			0.2	20	
% Moisture	14.2	0.100	% by Weight		14.3			1	20	
Duplicate (P9G0141-DUP3)		**Source: 9070076-09**		Prepared: 07/09/19 Analyzed: 07/10/19						
% Solids	83.7	0.100	% by Weight		84.0			0.4	20	
% Moisture	16.3	0.100	% by Weight		16.0			2	20	

Sample Extraction Data

Prep Method: Default Prep GenChem

Lab Number	Batch	Initial	Final	Date/Time
9070076-01	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-03	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-04	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-05	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-06	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-07	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-08	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-09	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-10	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-12	P9G0169	5 g	50 mL	07/11/19 9:03
9070076-13	P9G0170	5 g	50 mL	07/11/19 9:03
9070076-14	P9G0170	5 g	50 mL	07/11/19 9:03

Subcontracted Analyses

The following analyses were subcontracted to Analytical Environmental Services, Inc.

Lab Number	Analysis
9070076-01	Resistivity (Sub)
9070076-01	Sulfide (Sub)
9070076-03	Resistivity (Sub)
9070076-03	Sulfide (Sub)
9070076-04	Resistivity (Sub)
9070076-04	Sulfide (Sub)
9070076-05	Resistivity (Sub)
9070076-05	Sulfide (Sub)
9070076-06	Resistivity (Sub)
9070076-06	Sulfide (Sub)
9070076-07	Resistivity (Sub)
9070076-07	Sulfide (Sub)
9070076-08	Resistivity (Sub)
9070076-08	Sulfide (Sub)
9070076-09	Resistivity (Sub)
9070076-09	Sulfide (Sub)
9070076-10	Resistivity (Sub)
9070076-10	Sulfide (Sub)
9070076-12	Resistivity (Sub)
9070076-12	Sulfide (Sub)
9070076-13	Resistivity (Sub)
9070076-13	Sulfide (Sub)
9070076-14	Resistivity (Sub)
9070076-14	Sulfide (Sub)

The following analyses were subcontracted to Gulf Coast Analytical Labs, Inc.

Lab Number	Analysis
9070076-01	ORP (Sub)
9070076-03	ORP (Sub)
9070076-04	ORP (Sub)
9070076-05	ORP (Sub)
9070076-06	ORP (Sub)
9070076-07	ORP (Sub)
9070076-08	ORP (Sub)
9070076-09	ORP (Sub)
9070076-10	ORP (Sub)
9070076-12	ORP (Sub)
9070076-13	ORP (Sub)
9070076-14	ORP (Sub)

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Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

IRT-14 2.5 2.6

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

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Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: 66W-0027

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310, HUBERT STREET RALEIGH, NC, 27606
Phone: 919-719-1845 Fax (Yes) (No): ____
Email (Yes) (No) Email Address ____
EDD Type: ____ PDF ✓ Excel ____ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: VARIOUS

Project Name: FAYPWC Big Rockfish Creek Outfall
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT STREET, RALEIGH, NC, 27606
Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☐ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	✓		
Received ON WET ICE? Temp ____			
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			✓
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL
Certification: NELAC ____ USACE ____ FL ____ NC ____ SC ____ OTHER ____ N/A ____
Water Chlorinated: YES ____ NO ____
Sample Iced Upon Collection: YES ____ NO ____

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture Content	pH	Chloride	Sulfate	Electrical Resistivity	Redox	Sulfide	REMARKS	PRISM LAB ID NO.
B-2 (5-4, 13.5-15)	6/6/19		SOIL	G				↓	↓	↓	↓	↓	↓	↓		01/02
B-13 (5-4, 13.5-15)	6/11/19															
B-3 (13.5-15, 18.5-20)	6/5/19	~~0151~~														03
B-10 (8.5-10, 13.5-15)	6/6/19															04
B-11 (3.5-5, 8.5-10)	6/25/19															05
B-34 (8.5-10, 13.5-15)	6/27/19															06
B-53 (3.5-5, 8.5-10)	6/26/19															07
B-54 (8.5-10, 13.5-15)	6/26/19															08
B-55 (8.5-10, 13.5-15)	6/26/19															09
B-74 (8.5-10, 13.5-15)	6/24/19															10
B-75 (3.5-5, 8.5-10)	6/24/19															11

Sampler's Signature ____ Sampled By (Print Name) ____ Affiliation ____

PRESS DOWN FIRMLY - 3 COPIES

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	07/03/19	12:51
Relinquished By: (Signature)	Received By: (Signature)	7-5-19	11:00
Relinquished By: (Signature)	Received For Prism Laboratories By:	7-5-19	13:40

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other ____

Log-In Group No. 9070076

Additional Comments: 10 Composite samples

PRISM USE ONLY
Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

IRT-14 2.5 2.6

CHAIN OF CUSTODY RECORD

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: 66W-0027

Project Name: FAYNC Big Rockfish Creek

Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)

*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements

Client Company Name: F&R

Report To/Contact Name: MOHAMMAD KAYSER

Reporting Address: 310 HUBERT STREET RALEIGH, NC

Phone: 919-719-1845 Fax (Yes) (No):

Email (Yes) (No) Email Address

EDD Type: ___ PDF ✓ Excel ___ Other

Site Location Name: FAYETTVILLE

Site Location Physical Address: VARIOUS

Invoice To: F&R

Address: 310 HUBERT STREET

Purchase Order No./Billing Reference 66W-0027

Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days

"Working Days" ☐ 6-9 Days ☐ Standard 10 days

Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	✓		
Received ON WET ICE? Temp ____	✓		
PROPER PRESERVATIVES Indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?	✓		
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification: NELAC ___ USACE ___ FL ___ NC ___
SC ___ OTHER ___ N/A ___

Water Chlorinated: YES ___ NO ___

Sample Iced Upon Collection: YES ___ NO ___

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture content	pH	chloride	sulfate	sulfides	Redox	Electrical conductivity	REMARKS	PRISM LAB ID NO.
B-77 (18.5'-20', 23.5'-25')	6/25/19		SOIL	G				↓	↓	↓	↓	↓	↓	↓		12
B-78 (3.5'-15', 18.5'-20')	6/25/19		↓	↓												13
B-79 (8.5'-10', 13.5'-15')	6/25/19		↓	↓												14

PRESS DOWN FIRMLY - 3 COPIES

Sampler's Signature ____ Sampled By (Print Name) ____ Affiliation ____

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	07/03/19	12:51
Relinquished By: (Signature)	Received By: (Signature)	7-5-19	11:00
Relinquished By: (Signature)	Received For Prism Laboratories By:	7-5-19	13:40

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☑ Prism Field Service ☐ Other ____

Log-In Group No.

Additional Comments: 3 Composite Samples

PRISM USE ONLY

Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC	☐ NC ☐ SC
☐ ____	☐ ____	☐ ____	☐ ____	☐ ____	☐ ____	☐ ____	☐ ____	☐ ____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT

Prism Laboratories
PO Box 240543
Charlotte NC 282240543

ATTENTION
Angela Overcash

PROJECT ID
9070076

LABORATORY REPORT NUMBER
1907819

DATE
July 17, 2019

Primary Data Review By

Chris Pafford
Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.**
- **AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582**
- **AIHA-LAP,LLC Laboratory ID:100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.**
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll fee at 883.315.4243

1907819

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9070076

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Analytical Environmental Services, Inc.
3080 Presidential Parkway
Atlanta, GA 30340
Phone :(770) 457-8177
Fax: NA

5 day TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9070076-01	**Solid**	**Sampled:06/06/19 00:00**	B-2 / B-13	
Sulfide (Sub)		06/13/19 00:00		
Resistivity (Sub)		07/04/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9070076-03	**Solid**	**Sampled:06/05/19 00:00**	B-3	
Resistivity (Sub)		07/03/19 00:00		
Sulfide (Sub)		06/12/19 00:00		
Containers Supplied:				
Sample ID: 9070076-04	**Solid**	**Sampled:06/06/19 00:00**	B-10	
Resistivity (Sub)		07/04/19 00:00		
Sulfide (Sub)		06/13/19 00:00		
Containers Supplied:				
Sample ID: 9070076-05	**Solid**	**Sampled:06/25/19 00:00**	B-17	
Resistivity (Sub)		07/23/19 00:00		
Sulfide (Sub)		07/02/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
Jalon Uf Fedex	7.9.19	Fedex	
Released By	Date	Received By	Date
		Aneem D Peters	7-10-19 9:50
Released By	Date	Received By	Date
Released By	Date	Received By	Date

1901819

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9070076

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A_____

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9070076-06	**Solid**	**Sampled:06/27/19 00:00**	B-34	
Sulfide (Sub)		07/04/19 00:00		
Resistivity (Sub)		07/25/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9070076-07	**Solid**	**Sampled:06/26/19 00:00**	B-53	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
Sample ID: 9070076-08	**Solid**	**Sampled:06/26/19 00:00**	B-54	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
Sample ID: 9070076-09	**Solid**	**Sampled:06/26/19 00:00**	B-55	
Sulfide (Sub)		07/03/19 00:00		
Resistivity (Sub)		07/24/19 00:00		
Containers Supplied:				
Sample ID: 9070076-10	**Solid**	**Sampled:06/24/19 00:00**	B-74	
Resistivity (Sub)		07/22/19 00:00		
Sulfide (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9070076-12	**Solid**	**Sampled:06/25/19 00:00**	B-77	
Resistivity (Sub)		07/23/19 00:00		
Sulfide (Sub)		07/02/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
[signature] Fedex	7-9-19	Fedex	
Released By	Date	Received By	Date
		[signature]	7-10-19 9:50
Released By	Date	Received By	Date
Released By	Date	Received By	Date

1907819

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9070076

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A____

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9070076-13	**Solid**	**Sampled:06/25/19 00:00**	B-78	
Resistivity (Sub)		07/23/19 00:00		
Sulfide (Sub)		07/02/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9070076-14	**Solid**	**Sampled:06/25/19 00:00**	B-79	
Resistivity (Sub)		07/23/19 00:00		
Sulfide (Sub)		07/02/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
Fedex	7.9.19	Fedex	
Fedex		Amanda Peterson	7-10-19 9:50
Released By	Date	Received By	Date
Released By	Date	Received By	Date
Released By	Date	Received By	Date

Analytical Environmental Services, Inc

Date: 18-Jul-19

Client: Prism Laboratories
Project: 9070076
Lab ID: 1907819

Case Narrative

Soil Resistivity Analysis by Method SW9050A:

Samples 1907819-001 - 1907819-003 were received outside EPA/Method specified holding time of 28 days for Resitivity analysis. Laboratory proceeded with analysis, per client history.

Sulfide Analysis by Method SW9030B/9034:

All samples were received outside EPA/Method specified holding time of 7 days for Sulfide analysis. Laboratory proceeded with analysis, per client history.

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-2/ B-13
Lab Order	1907819	**Tag Number:**	9070076-01
Project Name:	9070076	**Collection Date:**	6/6/2019 12:00:01 AM
Lab ID:	1907819-001A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	38.3	45.6	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	5300	H	0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	12.3		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-3
Lab Order	1907819	**Tag Number:**	9070076-03
Project Name:	9070076	**Collection Date:**	6/5/2019 12:00:01 AM
Lab ID:	1907819-002A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	38.9	46.3	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	4970	H	0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	13.6		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-10
Lab Order	1907819	**Tag Number:**	9070076-04
Project Name:	9070076	**Collection Date:**	6/6/2019 12:00:01 AM
Lab ID:	1907819-003A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	37.3	44.4	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	5850	H	0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	14.1		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-11
Lab Order	1907819	**Tag Number:**	9070076-05
Project Name:	9070076	**Collection Date:**	6/25/2019 12:00:01 AM
Lab ID:	1907819-004A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	37.4	44.5	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	6930		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	14.4		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-34
Lab Order	1907819	**Tag Number:**	9070076-06
Project Name:	9070076	**Collection Date:**	6/27/2019 12:00:01 AM
Lab ID:	1907819-005A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	38.5	45.9	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	165000		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	16.9		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-53
Lab Order	1907819	**Tag Number:**	9070076-07
Project Name:	9070076	**Collection Date:**	6/26/2019 12:00:01 AM
Lab ID:	1907819-006A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	39.3	46.8	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	16400		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	14.6		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-54
Lab Order	1907819	**Tag Number:**	9070076-08
Project Name:	9070076	**Collection Date:**	6/26/2019 12:00:01 AM
Lab ID:	1907819-007A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					(SW9030B)				
Sulfide	BRL	H	40.3	48.0	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					(SW9050A)				
Resistivity (@100% Moisture Saturation)	25200		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	15.0		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-55
Lab Order	1907819	**Tag Number:**	9070076-09
Project Name:	9070076	**Collection Date:**	6/26/2019 12:00:01 AM
Lab ID:	1907819-008A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	38.3	45.6	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	18900		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	15.7		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-74
Lab Order	1907819	**Tag Number:**	9070076-10
Project Name:	9070076	**Collection Date:**	6/24/2019 12:00:01 AM
Lab ID:	1907819-009A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	42.4	50.5	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	12400		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	19.1		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-77
Lab Order	1907819	**Tag Number:**	9070076-12
Project Name:	9070076	**Collection Date:**	6/25/2019 12:00:01 AM
Lab ID:	1907819-010A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	41.0	48.8	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	3590		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	21.9		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-78
Lab Order	1907819	**Tag Number:**	9070076-13
Project Name:	9070076	**Collection Date:**	6/25/2019 12:00:01 AM
Lab ID:	1907819-011A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	41.2	49.0	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	24600		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	16.8		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

*	Value exceeds maximum contaminant level	E	Estimated value above quantitation range
BRL	Not Detected at MDL	S	Spike Recovery outside limits due to matrix
H	Holding times for preparation or analysis exceeded	>	Greater than Result value
N	Analyte not NELAC certified	J	Estimated value detected below Reporting Limit
B	Analyte detected in the associated method blank	<	Less than Result value

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-79
Lab Order	1907819	**Tag Number:**	9070076-14
Project Name:	9070076	**Collection Date:**	6/25/2019 12:00:01 AM
Lab ID:	1907819-012A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	729	H	40.8	48.6	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	17100		0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	17.7		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

Clear Save as

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

SAMPLE/COOLER RECEIPT CHECKLIST

1. Client Name: **Access Analytical, Inc.** AES Work Order Number: **1907819**

2. Carrier: FedEx [■] UPS [ ] USPS [ ] Client [ ] Courier [ ] Other _____

		Yes	No	N/A	Details	Comments
3.	Shipping container/cooler received in good condition?	◉	○	○	damaged ☐ leaking ☐ other ☐	
4.	Custody seals present on shipping container?	○	◉	○		
5.	Custody seals intact on shipping container?	○	○	◉		
6.	Temperature blanks present?	○	◉	○		
7.	Cooler temperature(s) within limits of 0-6°C? [See item 13 and 14 for temperature recordings.]	◉	○	○	Cooling initiated for recently collected samples / ice present ☐	
8.	Chain of Custody (COC) present?	◉	○	○		
9.	Chain of Custody signed, dated, and timed when relinquished and received?	◉	○	○		
10.	Sampler name and/or signature on COC?	○	◉	○		
11.	Were all samples received within holding time?	○	◉	○		
12.	TAT marked on the COC?	◉	○	○	If no TAT indicated, proceeded with standard TAT per Terms & Conditions. ☐	

13. Cooler 1 Temperature 2.1 °C Cooler 2 Temperature _____ °C Cooler 3 Temperature _____ °C Cooler 4 Temperature _____ °C

14. Cooler 5 Temperature _____ °C Cooler 6 Temperature _____ °C Cooler 7 Temperature _____ °C Cooler 8 Temperature _____ °C

15. Comments: _____

I certify that I have completed sections 1-15 (dated initials). MJ 7/10/19

		Yes	No	N/A	Details	Comments
16.	Were sample containers intact upon receipt?	◉	○	○		
17.	Custody seals present on sample containers?	○	◉	○		
18.	Custody seals intact on sample containers?	○	○	◉		
19.	Do sample container labels match the COC?	◉	○	○	incomplete info ☐ illegible ☐ no label ☐ other ☐	
20.	Are analyses requested indicated on the COC?	◉	○	○		
21.	Were all of the samples listed on the COC received?	◉	○	○	samples received but not listed on COC ☐ samples listed on COC not received ☐	
22.	Was the sample collection date/time noted?	◉	○	○		
23.	Did we receive sufficient sample volume for indicated analyses?	◉	○	○		
24.	Were samples received in appropriate containers?	◉	○	○		
25.	Were VOA samples received without headspace (< 1/4" bubble)?	○	○	◉		
26.	Were trip blanks submitted?	○	○	◉	listed on COC ☐ not listed on COC ☐	

27. Comments: _____

I certify that I have completed sections 16-27 (dated initials). AP 7/10/19

This section only applies to samples where pH can be checked at Sample Receipt.

		Yes	No	N/A	Details	Comments
28.	Have containers needing chemical preservation been checked? *	○	○	◉		
29.	Containers meet preservation guidelines?	○	○	◉		
30.	Was pH adjusted at Sample Receipt?	○	○	◉		

* Note: Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH.

I certify that I have completed sections 28-30 (dated initials). AP 7/10/19

Locked

Client: Prism Laboratories
Project Name: 9070076
Lab Order: 1907819

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1907819-001A	B-2/ B-13	6/6/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-001A	B-2/ B-13	6/6/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-001A	B-2/ B-13	6/6/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-002A	B-3	6/5/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-002A	B-3	6/5/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-002A	B-3	6/5/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-003A	B-10	6/6/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-003A	B-10	6/6/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-003A	B-10	6/6/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-004A	B-11	6/25/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-004A	B-11	6/25/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-004A	B-11	6/25/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-005A	B-34	6/27/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-005A	B-34	6/27/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-005A	B-34	6/27/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-006A	B-53	6/26/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-006A	B-53	6/26/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-006A	B-53	6/26/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-007A	B-54	6/26/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-007A	B-54	6/26/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-007A	B-54	6/26/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-008A	B-55	6/26/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-008A	B-55	6/26/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-008A	B-55	6/26/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-009A	B-74	6/24/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-009A	B-74	6/24/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-009A	B-74	6/24/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-010A	B-77	6/25/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-010A	B-77	6/25/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019

Analytical Environmental Services, Inc

Date: 18-Jul-19

Client: Prism Laboratories
Project Name: 9070076
Lab Order: 1907819

Dates Report

Lab Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1907819-010A	B-77	6/25/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-011A	B-78	6/25/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-011A	B-78	6/25/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-011A	B-78	6/25/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019
1907819-012A	B-79	6/25/2019 12:00:01AM	Solid	Sulfide		7/12/2019 9:15:00AM	07/12/2019
1907819-012A	B-79	6/25/2019 12:00:01AM	Solid	Soil Resistivity		7/12/2019 4:00:00PM	07/16/2019
1907819-012A	B-79	6/25/2019 12:00:01AM	Solid	PERCENT MOISTURE			07/11/2019

Client: Prism Laboratories
Project Name: 9070076
Workorder: 1907819

ANALYTICAL QC SUMMARY REPORT

BatchID: 281486

Sample ID: **LCS-281486**	Client ID:				Units: **ohms*cm**	Prep Date: **07/12/2019**	Run No: **402722**
SampleType: **LCS**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281486**	Analysis Date: **07/16/2019**	Seq No: **9039424**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	9046	0	10000		90.5	90	110				

Sample ID: **1907819-004ADUP**	Client ID: **B-11**				Units: **ohms*cm**	Prep Date: **07/12/2019**	Run No: **402722**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281486**	Analysis Date: **07/16/2019**	Seq No: **9039442**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	6744	0						6929	2.71	30	

Sample ID: **1907819-011ADUP**	Client ID: **B-78**				Units: **ohms*cm**	Prep Date: **07/12/2019**	Run No: **402722**
SampleType: **DUP**	TestCode: **Soil Resistivity SW9050A**				BatchID: **281486**	Analysis Date: **07/16/2019**	Seq No: **9039450**

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Resistivity (@100% Moisture Saturatic	24910	0						24570	1.36	30	

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

Client: Prism Laboratories
Project Name: 9070076
Workorder: 1907819

ANALYTICAL QC SUMMARY REPORT

BatchID: 281948

Sample ID: MB-281948	Client ID:				Units: mg/Kg	Prep Date: 07/12/2019	Run No: 402566
SampleType: MBLK	TestCode: Sulfide by SW9030B/9034				BatchID: 281948	Analysis Date: 07/12/2019	Seq No: 9035989

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	BRL	40.0									

Sample ID: LCS-281948	Client ID:				Units: mg/Kg	Prep Date: 07/12/2019	Run No: 402566
SampleType: LCS	TestCode: Sulfide by SW9030B/9034				BatchID: 281948	Analysis Date: 07/12/2019	Seq No: 9035993

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1100	40.0	1100		100	70	130				

Sample ID: 1907819-001AMS	Client ID: B-2/ B-13				Units: mg/Kg-dry	Prep Date: 07/12/2019	Run No: 402566
SampleType: MS	TestCode: Sulfide by SW9030B/9034				BatchID: 281948	Analysis Date: 07/12/2019	Seq No: 9036020

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	955.8	43.4	1195		80.0	68.9	122				H

Sample ID: 1907819-001AMSD	Client ID: B-2/ B-13				Units: mg/Kg-dry	Prep Date: 07/12/2019	Run No: 402566
SampleType: MSD	TestCode: Sulfide by SW9030B/9034				BatchID: 281948	Analysis Date: 07/12/2019	Seq No: 9036021

Analyte	Result	RPT Limit	SPK value	SPK Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	%RPD	RPD Limit	Qual
Sulfide	1073	44.7	1230		87.3	68.9	122	955.8	11.6	20	H

Qualifiers:

>	Greater than Result value	<	Less than Result value	B	Analyte detected in the associated method blank
BRL	Below reporting limit	E	Estimated (value above quantitation range)	H	Holding times for preparation or analysis exceeded
J	Estimated value detected below Reporting Limit	N	Analyte not NELAC certified	R	RPD outside limits due to matrix
Rpt Lim	Reporting Limit	S	Spike Recovery outside limits due to matrix		

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Prism Laboratories, Inc.
PO BOX 240543
Charlotte, NC 28224

ATTENTION
Angela Overcash

PROJECT ID
9070076

LABORATORY REPORT NUMBER
219071016

DATE
07/18/2019

Primary Data Review By

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 Innovation Park Dr., Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

GCAL
ANALYTICAL LABORATORIES, LLC

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 07/18/2019

GCAL Report 219071016

Project 9070076

Deliver To	*Additional Recipients*
Angela Overcash Prism Laboratories, Inc. PO BOX 240543 Charlotte, NC 28224 706-529-6364	NONE

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL Report 219071016

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: Access Analytical **Report:** 219071016

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21907101601	B-2/B-13	Solid	06/06/2019 00:01	07/10/2019 10:05
21907101602	B-3	Solid	06/05/2019 00:01	07/10/2019 10:05
21907101603	B-10	Solid	06/06/2019 00:01	07/10/2019 10:05
21907101604	B-11	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101605	B-34	Solid	06/27/2019 00:01	07/10/2019 10:05
21907101606	B-53	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101607	B-54	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101608	B-55	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101609	B-74	Solid	06/24/2019 00:01	07/10/2019 10:05
21907101610	B-77	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101611	B-78	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101612	B-79	Solid	06/25/2019 00:01	07/10/2019 10:05

Summary of Compounds Detected

B-2/B-13

Collect Date 06/06/2019 00:01 **GCAL ID** 21907101601
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	401			mV

B-3

Collect Date 06/05/2019 00:01 **GCAL ID** 21907101602
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	421			mV

B-10

Collect Date 06/06/2019 00:01 **GCAL ID** 21907101603
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	444			mV

B-11

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101604
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	458			mV

Summary of Compounds Detected

B-34

Collect Date 06/27/2019 00:01 **GCAL ID** 21907101605
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	411			mV

B-53

Collect Date 06/26/2019 00:01 **GCAL ID** 21907101606
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	425			mV

B-54

Collect Date 06/26/2019 00:01 **GCAL ID** 21907101607
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	427			mV

B-55

Collect Date 06/26/2019 00:01 **GCAL ID** 21907101608
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	441			mV

Summary of Compounds Detected

B-74

Collect Date 06/24/2019 00:01 **GCAL ID** 21907101609
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	457			mV

B-77

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101610
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	497			mV

B-78

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101611
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	438			mV

B-79

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101612
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	457			mV

Sample Results

B-2/B-13

Collect Date	06/06/2019 00:01	**GCAL ID**	21907101601
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	401			mV

B-3

Collect Date	06/05/2019 00:01	**GCAL ID**	21907101602
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	421			mV

B-10

Collect Date	06/06/2019 00:01	**GCAL ID**	21907101603
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	444			mV

B-11

Collect Date	06/25/2019 00:01	**GCAL ID**	21907101604
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	458			mV

Sample Results

B-34

Collect Date	06/27/2019 00:01	**GCAL ID**	21907101605
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	411			mV

B-53

Collect Date	06/26/2019 00:01	**GCAL ID**	21907101606
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	425			mV

B-54

Collect Date	06/26/2019 00:01	**GCAL ID**	21907101607
Receive Date	07/10/2019 10:05	**Matrix**	Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	427			mV

Sample Results

B-55

Collect Date 06/26/2019 00:01 **GCAL ID** 21907101608
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	441			mV

B-74

Collect Date 06/24/2019 00:01 **GCAL ID** 21907101609
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	457			mV

B-77

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101610
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	497			mV

Sample Results

B-78

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101611
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	438			mV

B-79

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101612
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

Prep Date	Prep Batch	Prep Method	Dilution	Analysis Date	By	Analytical Batch
NA	NA	NA	1	07/18/2019 16:30	AJE	663868

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	457			mV

Client ID: 4565 - Access Analytical
SDG: 219071016
PM: DLH

PRISM LABORATORIES INC | Full-Service Analytical & Environmental Solutions

0.1°C E34
55CFM
#7756-1963-8114

SUBCONTRACT ORDER
Prism Laboratories, Inc.
9070076

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A____

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Gulf Coast Analytical Labs, Inc.
10781 Coursey Blvd
Baton Rouge, LA 70816
Phone :(225) 769-4900
Fax: (225) 767-5717

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9070076-01	**Solid**	**Sampled:06/06/19 00:00**	B-2/B-13	-1
ORP (Sub)		06/11/19 00:00		
Containers Supplied: 1x 4oz jar				
Sample ID: 9070076-03	**Solid**	**Sampled:06/05/19 00:00**	B-3	-2
ORP (Sub)		06/10/19 00:00		
Containers Supplied:				
Sample ID: 9070076-04	**Solid**	**Sampled:06/06/19 00:00**	B-10	-3
ORP (Sub)		06/11/19 00:00		
Containers Supplied:				
Sample ID: 9070076-05	**Solid**	**Sampled:06/25/19 00:00**	B-11	-4
ORP (Sub)		06/30/19 00:00		
Containers Supplied:				
Sample ID: 9070076-06	**Solid**	**Sampled:06/27/19 00:00**	B-34	-5
ORP (Sub)		07/02/19 00:00		

Released By	Date	Received By	Date
Fedex	7.9.19	Fedex	
Fedex	7-10-19		7-10-19 1005

Client ID: 4565 - Access Analytical

SDG: 219071016

PM: DLH

UBCONTRACT ORDER

Prism Laboratories, Inc.

9070076

#7756-6903-8114

D.I.C E34 55cm

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A____

Analysis	Due	Expires	Laboratory ID	Comments
Containers Supplied:				
Sample ID: 9070076-07	Solid	Sampled:06/26/19 00:00	B-53	-6
ORP (Sub)		07/01/19 00:00		
Containers Supplied: 1 x 4oz jar				
Sample ID: 9070076-08	Solid	Sampled:06/26/19 00:00	B-54	-7
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9070076-09	Solid	Sampled:06/26/19 00:00	B-55	-8
ORP (Sub)		07/01/19 00:00		
Containers Supplied:				
Sample ID: 9070076-10	Solid	Sampled:06/24/19 00:00	B-74	-9
ORP (Sub)		06/29/19 00:00		
Containers Supplied:				
Sample ID: 9070076-12	Solid	Sampled:06/25/19 00:00	B-77	-10
ORP (Sub)		06/30/19 00:00		
Containers Supplied:				
Sample ID: 9070076-13	Solid	Sampled:06/25/19 00:00	B-78	-11
ORP (Sub)		06/30/19 00:00		
Containers Supplied:				
Sample ID: 9070076-14	Solid	Sampled:06/25/19 00:00	B-79	-12
ORP (Sub)		06/30/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
Jahnoff Fedex	7.9.19	Fedex	
Fedex	7-10-19	Tiffany Tang	7-10-19 1005

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 219071016	
Client PM DLH 4565 - Access Analytical	**Transport Method** FEDEX
Profile Number 80251	**Received By** Savage, Tiffany R
Line Item(s) 2 - Solid	**Receive Date(s)** 07/10/19

CHECKLIST	YES	NO
Samples received with proper thermal preservation?	☑	☐
Radioactivity is <1600 cpm? If no, record cpm value in notes section.	☑	☐
COC relinquished and complete (including sampleIDs, collect times, and sampler)?	☑	☐
All containers received in good condition and within hold time?	☑	☐
All sample labels and containers received match the chain of custody?	☑	☐
Preservative added to any containers?	☐	☑
If received, was headspace for VOC water containers < 6mm?	☑	☐
Samples collected in containers provided by GCAL?	☐	☑

COOLERS

Airbill	Thermometer ID: E34	Temp °C
7756-6903-8114		0.1

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

Revision 1.6

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

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FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Big Rockfish Creek Outfall
Aerial Crossings
Fayetteville, North Carolina
F&R Project No. 66W-0027

Prepared For:

WK DICKSON
community infrastructure consultants

720 Corporate Center Drive
Raleigh, North Carolina 27607

Prepared By:
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March 4, 2020

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March 4, 2020

Mr. Mark Fisher, P.E.
Program Manager
WK Dickson & Co., Inc.
720 Corporate Center Drive
Raleigh, North Carolina 27607

Subject: Report of Subsurface Exploration & Geotechnical Engineering Evaluation
FAYPWC – Big Rockfish Creek Outfall Aerial Crossings
Fayetteville, North Carolina
F&R Project No. 66W-0027

Dear Mr. Fisher:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the above-referenced project in Fayetteville, North Carolina. Our services were performed in general accordance with F&R's Proposal No. 1966-00042 Revision 2 dated July 20, 2018. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and subsurface conditions, and presents our geotechnical evaluations and recommendations for design and construction of the project.

We have enjoyed working with you on this project, and we are prepared to assist you with the recommended quality assurance observation and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

Mohammad Kayser, Ph.D., P.E.
Geotechnical Engineer

W. Patrick Alton, P.E.
Assistant Branch Manager

TABLE OF CONTENTS

APPENDICES

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the areas of the proposed aerial crossings and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of three Standard Penetration Test (SPT) borings (B-10, B-10A and B-12) to depths ranging from 50 to 80 feet below the existing ground surface;
- Preparation of typed boring logs and development of a subsurface profile;
- Performing corrosivity testing on a representative soil sample;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this report by professional engineers.

2.0 PROJECT INFORMATION

As part of the Big Rockfish Creek Outfall, F&R completed drilling of seventy-six (76) SPT borings to depths ranging from 10 to 80 feet below the existing ground surface in Fayetteville, North Carolina. A *Report of Subsurface Exploration and Geotechnical Engineering Evaluation* for the outfall portion was submitted on August 12, 2019. Based on preliminary plans (90% submittal sheet C-8 dated 7/24/19) provided to F&R by McKim & Creed, two aerial crossings have been proposed for the sewer line to cross the Big Rockfish Creek (see Figure 1 in Appendix I).

Based on the 90% project plan provided by McKim & Creed, the proposed sewer line between manholes MH 22 and MH 24 will be designed with 24" diameter ductile iron pipe (DIP). Ground surface elevations near manholes MH 22 and MH 23 are approximately 106 and 103, respectively (elevations obtained from the provided 90% project plan). A stream is located between these two manholes with bottom of stream elevation ranging from 89.5 to 91 feet. Ground surface elevation near manhole MH 24 is approximately 110. Another stream is located between manholes MH 23 and MH 24 with bottom of stream elevation ranging from 90.5 to 91 feet. The approximate invert elevation (EL) of the sewer line between manholes MH 22 and MH 24 will be at about EL 98 feet, which is up to about 1 to 8 feet above the bottom of the stream. As such, aerial crossings will be required to cross Big Rockfish Creek in two places, which will require two, three-span crossings (see Figure 2 in Appendix I). The first aerial sewer line crossing has been proposed from station 52+95 to station 54+70 and will have span lengths of about 55, 65, and 55 feet. The second crossing has been proposed from station 55+35 to station 56+70 and will have span lengths of about 35, 65, and 35 feet. Each crossing will require four supports – one on each side of the stream bank and two within the channel (four total at each crossing).

Based on the loading information provided by CDM Smith, the maximum structural loads at the piers are: compression = 70 kips, lateral = 12 kips, and moment = 30 kip-ft. WK Dickson performed a scour analysis at stations 54+00 and 56+00 per the *"Draft Pier Scour Analysis for Big Rockfish Creek Outfall"* memorandum dated 10/10/19. Maximum scour depths of 8.2 and 5.3 feet were calculated for a 50 year storm event at crossings 1 and 2, respectively. Assuming the scour values were measured below the lowest elevation of the stream and using calculated scour depths relative to the existing ground surface provided in the plans, scour to EL 82 and 85.2 at crossings 1 and 2, respectively, were used in foundation design performed by F&R.

3.0 EXPLORATION PROCEDURES

F&R initially advanced two SPT borings (B-10 and B-12) to a depth of 50 feet below the existing ground surface at the approximate locations shown on the Boring Location Plan presented as Figure 2 in Appendix I. During the field exploration, structural loading and scour information were not available; therefore the borings were advanced to a nominal depth of 50 feet. Upon receipt of the loading and scour information, F&R determined that a deeper boring was necessary. As such, F&R performed an additional deeper boring (B-10A) near boring B-10 to a depth of 80 feet to obtain additional information for foundation design purposes. The boring locations were established in the field by F&R using a hand-held GPS unit. Ground surface elevations at the boring locations were interpolated from the provided 90% submittal plans. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The borings were advanced by track- and ATV-mounted drill rigs using mud rotary drilling technique for borehole stabilization. At the boring locations, representative soil samples were obtained using a standard two-inch, outside-diameter (O.D.), split-barrel sampler in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils (Standard Penetration Test). The number of blows required to drive the split-barrel sampler three, consecutive 6-inch increments with an automatic hammer is recorded, and the blows of the last two 6-inch increments are added to obtain the Standard Penetration Test (SPT) N-values representing the penetration resistance of the soil. Standard Penetration Tests were performed at a nominal interval of approximately 5 feet.

A representative portion of soil was obtained from each SPT sample, sealed in a glass jar, labeled, and transported to our laboratory for classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM D2488). A boring log for each test boring is presented in Appendix II.

At the termination of drilling, groundwater level measurements in the borings were not available due to the use of mud rotary drilling technique. After a stabilization period of approximately 24-hours groundwater levels were measured in the borings. Temporary piezometers were installed in

borings B-10 and B-12 in order to facilitate the obtainment of stabilized groundwater measurements. The temporary piezometers consisted of 1-inch diameter, hand slotted PVC pipe installed into the completed borings.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project sites are located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad flat plain with widely spaced low rolling hills where the near surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. It is noted that the Coastal Plain soils vary in thickness from only a few feet along the western border to over ten thousand feet in some areas along the coast.

According to the Geologic Map of North Carolina (1985), the site is located within an area mapped as Cretaceous-period deposits and is comprised of sedimentary deposits that appear to be located within the Cape Fear Formation. The Cape Fear Formation is described as yellowish-gray to blue-gray, mottled red to yellowish-orange sandstone and sandy mudstone with graded and laterally continuous bedding. Blocky clay, faint cross-bedding and feldspar and mica are common.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on an interpretation of the boring data using normally-accepted, geotechnical engineering judgments. Although the individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. A subsurface profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profile is presented as Figure 3 in Appendix I. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within explored areas of the project site. More-detailed descriptions of the subsurface conditions at the individual boring locations are presented on the Boring Logs provided in Appendix II.

4.2.2 Surficial Materials

Thicknesses of the surficial material were not measured in the borings. Based on the Surficial Organic Soils encountered in nearby borings, it is anticipated the surficial organic soil thickness at the borings will likely range from about 1 to 4 inches. The Surficial Organic Soils typically consist of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term *Surficial Organic Soil* is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil depths provided in this report are based on driller observations and should be considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of the Surficial Organic Soil depths is subjective.

4.2.3 Alluvial Soils

Alluvial soils were encountered in the borings to depths ranging from approximately 7 to 17 feet. Alluvial soils are defined as soils that have been transported by water. The alluvial soils consisted of fine sands, and silty and clayey sands (USCS – SP, SM & SC) exhibiting very loose to medium dense relative density with SPT N-values ranging from 2 to 13 blows per foot (bpf).

Very loose (SPT N-value of 4 bpf or less) alluvial soil layers were encountered in borings B-10 and B-10A from the ground surface and extended to depths ranging from approximately 3.5 to 7 feet. Very loose soil layers were encountered in borings B-10 and B-10A again at depths of approximately 7 to 12 feet and 12 to 17 feet, respectively.

4.2.4 Coastal Plain Soils

Coastal Plain soils were encountered in the borings below the alluvial soils. The Coastal Plain soils generally consisted of silty and clayey sands (USCS - SM & SC) and low to high plasticity sandy clays and clayey silts (CL, CH & ML).

The coastal plain soils exhibited loose to very dense relative density (SPT N-values ranging from 5 to 60 bpf) for the sands and firm to very hard consistency (SPT N-values ranging from 5 to 73 bpf) for the clays and silts. Boring B-10A encountered a very dense clayey sand (SC) soil layer with an SPT N-value higher than 50 bpf from a depth of about 62 to 67 feet.

A highly plastic clay (CH) layer was encountered in boring B-10 from a depth of 22 to 42 feet. In boring B-10A highly plastic clay (CH) layers were encountered at depths of about 17 to 27 feet and again from a depth of about 42 to 62 feet.

4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS

Moist soils (*i.e.*, within 3 percentage points of the estimated optimum moisture) were encountered in the borings from the ground surface to depths ranging from approximately 2 to 7 feet. Wet to saturated soils (more than 3 percentage points over the estimated optimum moisture content) were generally encountered below the moist soils to the termination depths of the borings. Boring B-12 encountered another moist soil layer from a depth of about 17 to 22 feet. Boring B-10A encountered intermittent moist soil layers in the deeper soil profile at depths of about 57 to 67 feet and 77 to 80 feet.

At the termination of drilling, groundwater level measurements in the borings were not measured due to the use of mud rotary drilling techniques. After a stabilization period of approximately 24-hours groundwater levels were measured in the borings. Groundwater was encountered after a stabilization period of about 24 hours in the borings at depths ranging from approximately 3 to 10.5 feet.

It should also be noted that soil moisture and groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. Due to the presence of relatively impervious silty/clayey soils noted on the project site, trapped or perched water conditions should be anticipated during periods of inclement weather and during seasonally wet periods.

4.4 LABORATORY TESTING

Geotechnical index testing was not performed on the samples obtained from the aerial crossing borings. However, geotechnical index testing was performed at other borings located along the sewer line as provided in our previously issued geotechnical engineering report for the outfall.

To aid in assessing the corrosivity potential of the on-site soils, a composite soil sample from boring B-10 was subjected to pH, chloride ion, soluble sulfates, electrical resistivity, redox potential, and sulfides testing. Corrosion potential of soils for underground structures is dependent upon these factors. The results are presented in the following table:

Boring	Sample Depth (ft)	pH	Chlorides (mg/kg)	Sulfates (mg/kg)	Sulfides (mg/kg)	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)	Corrosive Potential
B-10	8.5 - 10 13.5 - 15	4.0	< 29*	320	< 44.4*	5,850	444	14.9	Low

*Below indicated reporting limits

Based on AWWA C105/A21.5 (Polyethylene Encasement for Ductile-Iron Pipe Systems), the soils on this site generally do not appear to have a high corrosion potential based on the slightly acidic pH readings, generally trace sulfide concentrations, high resistivity, and high redox potential.

We are not aware of the existence of other corrosive factors such as coal, cinders, muck, peat, mine wastes, or landfills at this site, which would otherwise automatically categorize the site as highly corrosive and negate the test results.

5.0 ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the three soil test borings performed by F&R, our experience with similar projects and subsurface conditions, and the limited information provided to us regarding the proposed construction. It is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed construction from a geotechnical engineering perspective provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project.

F&R previously issued a "Report of Subsurface Investigation and Geotechnical Engineering Evaluation" for the outfall portion of the project dated August 12, 2019. Therefore, this report is being submitted for the aerial crossings only.

5.2 AERIAL CROSSINGS SUPPORT

Based on the 90% project plan provided by McKim & Creed, the proposed sewer line between manholes MH 22 and MH 24 will be designed with 24" diameter ductile iron pipe (DIP). The approximate invert elevation (EL) of the sewer line between manholes MH 22 and MH 24 will be at about EL 98 feet, which is up to about 1 to 8 feet above the bottom of the stream. As such, aerial crossings will be required to cross Big Rockfish Creek in two places, which will require two, three-span crossings. The first aerial sewer line crossing has been proposed from station 52+95 to station 54+70 and will have span lengths of about 55, 65, and 55 feet. The second crossing has been proposed from station 55+35 to station 56+70 and will have span lengths of about 35, 65, and 35 feet. Each crossing will require four supports – one on each side of the stream bank and two within the channel (four total at each crossing).

WK Dickson performed a scour analysis at stations 54+00 (Crossing No. 1) and 56+00 (Crossing No. 2). At Crossings 1 and 2, maximum scour depths of 8.2 and 5.3 feet were calculated, respectively, for the 50 year storm event. It was noted that the scour calculated for the 100 year storm event was less than the scour from the 50 year storm; therefore, F&R used the 50-year scour in our design. Scour analysis was not performed for the outer supports, which are located

inside the stream bank just outside of the channel, however they also appear to be located within the potential scour envelope. As discussed with WK Dickson, for foundation design purposes, the calculated scour depths were assumed to apply evenly to each of the 4 supports at each crossing. Using the calculated scour depths relative to the existing ground surface provided in the plans, scour to EL 82 and 85.2 at crossings 1 and 2, respectively, were used in our design.

Structural loading information was provided by CDM Smith. The following maximum loads at the top of the pier were provided:

- Maximum axial load = 70 kips,
- Maximum lateral load = 12 kips,
- Maximum moment = 30 kip-ft, and
- Pier head deflection limit = 0.5 inches

Due to the pier head deflection limit and unsupported height resulting from the design scour depths, F&R recommends that drilled piers be used for support of the aerial crossings. We anticipate that each of the supports will consist of a single, 42 inch diameter drilled pier (8 piers in total). The cap is expected to be about 1 to 1.5 feet thick and the bottom of the cap/top of pier elevations are anticipated to range from about EL 96.5 to 97 feet.

F&R performed lateral load analyses using the computer program LPile. Our analysis used assumed soil parameters based on the subsurface conditions encountered in the test borings. A single drilled pier was modeled utilizing a lateral load of 12 kips, a moment of 30 kip-ft, and an axial load of 70 kips. A pier head deflection less than 0.5 inches was achieved for a pier diameter of 42-inches and minimum tip elevations of 52 and 45 feet at Crossings 1 and 2, respectively. We anticipate that such deflections are structurally acceptable, but this should be confirmed by the project Structural Engineer.

The maximum axial load provided by CDM Smith was 70 kips per support. The drilled piers should primarily achieve the required axial capacity through skin friction. Axial capacity calculations performed using empirical equations at Crossings 1 and 2, indicate that adequate ultimate capacity should be available for these piers at elevations 47 and 46 feet, respectively.

At Crossing 1, a minimum tip elevation of EL 47 feet is needed to satisfy the required axial capacity and EL 52 feet is needed to satisfy the required lateral stability. Therefore, the axial capacity requirement controls at Crossing 1 and the drilled piers should be installed to a minimum tip elevation of EL 47 feet.

At Crossing 2, a minimum tip elevation of EL 46 feet is needed to satisfy the required axial capacity and EL 45 is needed to satisfy the required lateral stability. Therefore, the lateral stability requirement controls at Crossing 2 and the drilled piers should be installed to a minimum tip elevation of EL 45 feet.

We recommend that the following notes be placed on the structure drawings:

1. Drilled piers are designed for both skin friction and end bearing. Check field conditions for the required end bearing capacity of 10 tsf. To achieve the required end bearing capacity it is recommended to clean the bottom of the drilled holes and check the cleanliness using a steel probe in accordance with NCDOT specifications.
2. Permanent steel casings are required for the drilled piers located in the stream channel. Do not extend permanent casings below elevation 62.0 and 67.0 feet at Crossings 1 and 2, respectively, without prior approval from the engineer.
3. Install permanent steel casings by vibrating, screwing or driving permanent casings before excavating or disturbing any material below elevation 62.0 and 67.0 feet at Crossings 1 and 2, respectively.
4. Install drilled piers at Crossing 1 to a tip elevation no higher than 47.0 feet with the required end bearing capacity.
5. Install drilled piers at Crossing 2 to a tip elevation no higher than 45.0 feet with the required end bearing capacity.
6. SPT testing is required for drilled piers at Crossings 1 and 2.
7. Slurry construction is required for drilled piers at Crossings 1 and 2.

5.3 DRILLED PIER CONSTRUCTION

The contractor should submit a drilled pier construction plan for acceptance. Do not begin drilled pier construction until a construction plan has been accepted. The construction plan should contain detailed project-specific information including but not limited to: construction sequence, equipment, methods and procedures, etc. Construction of the drilled piers should be performed in accordance with American Concrete Institute (ACI) Standard Specification for Construction of Drilled Piers (ACI 336.1-01). A geotechnical engineer should observe the drilled pier construction. Due to the presence of shallow groundwater and surface water, the use of temporary and/or permanent steel casing and/or drilling slurry will be required in the drilled hole to maintain a stable condition to help prevent collapse/caving of the sides of the pier excavation. If slurry is utilized, there should be a minimum delay between drilling and concrete placement. Concrete should be placed with a tremie as soon as possible after drilling (*e.g*. no more than a few hours) and certainly within the same day as drilling. The slurry should be sampled prior to concrete placement to verify that it meets the appropriate ACI specifications.

The minimum cover of concrete over reinforcing steel should be designed at a minimum of 3 inches, in accordance with ACI, and obtained by the use of spacers attached to the reinforcing steel. The use of spacers attached to the reinforcing steel will help to assure that a minimum cover of 3 inches can be maintained and allow some tolerances during construction.

We recommend that full-time observation be provided during installation of the drilled piers. Test cylinders of concrete should be obtained on a per drilled pier basis and should achieve a minimum compressive strength denoted by the structural engineer.

5.4 DEWATERING

As previously mentioned, groundwater was generally encountered at or about 3 feet *above* the drilled pier cap. Therefore, it is anticipated that surface water and groundwater will be encountered during drilled pier installations and superstructure construction, and dewatering will be required in order to maintain drained, stable excavations and to prevent softening/loosening of the excavation subgrades. Groundwater elevations will likely vary throughout the year, and will be elevated especially during the seasonally-wet months (October through April). We understand that the method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, creek diversion, coffer dams, sheet piling, or other means.

It should be noted that if groundwater levels are not effectively maintained during construction, unstable excavations and loosened subgrade conditions could develop. Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels during construction. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

5.5 TEMPORARY EXCAVATION RECOMMENDATIONS

Mass excavations and other excavations required for construction of this project should be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations), or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested by the owner, designer, or contractor's "competent person".

6.0 CONTINUATION OF SERVICES

As previously discussed, the Geotechnical Engineer of Record should be retained to observe foundation construction activities and to report that the recommendations contained in this report are completed in a satisfactory manner. Our continued involvement on the project will aid in the proper implementation of the recommendations discussed herein. It should be noted that the actual soil conditions will vary across this site and thus the presence of the Geotechnical Engineer and/or his representative during construction will serve to validate the subsurface conditions and recommendations presented in this report. In addition, the geotechnical engineer should review the project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of WK Dickson and/or their agents, for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the subsurface exploration program, and generally-accepted geotechnical engineering practices. The evaluations and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

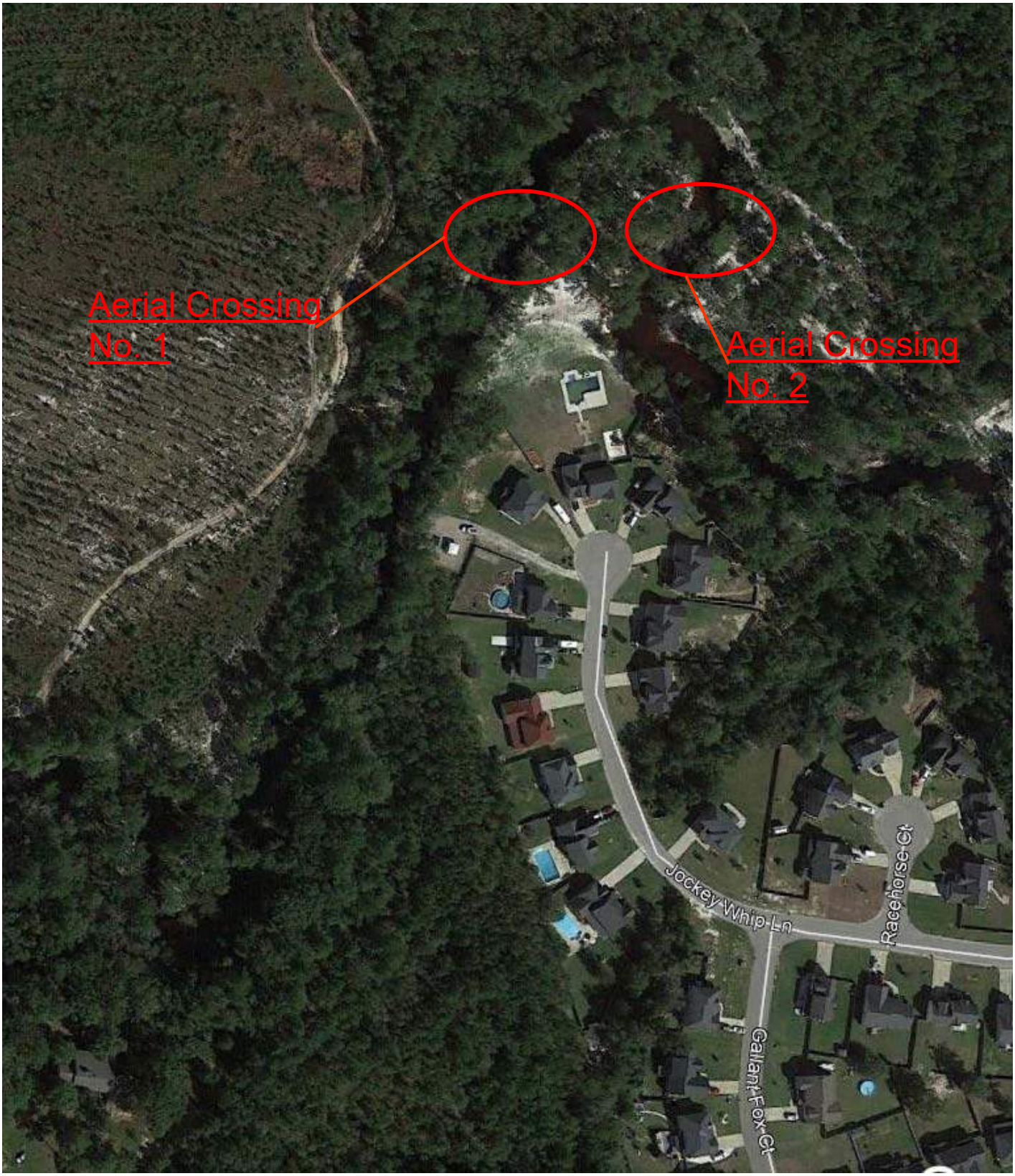
There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix V. We ask that you please review this information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork activities to observe that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the proposed construction, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

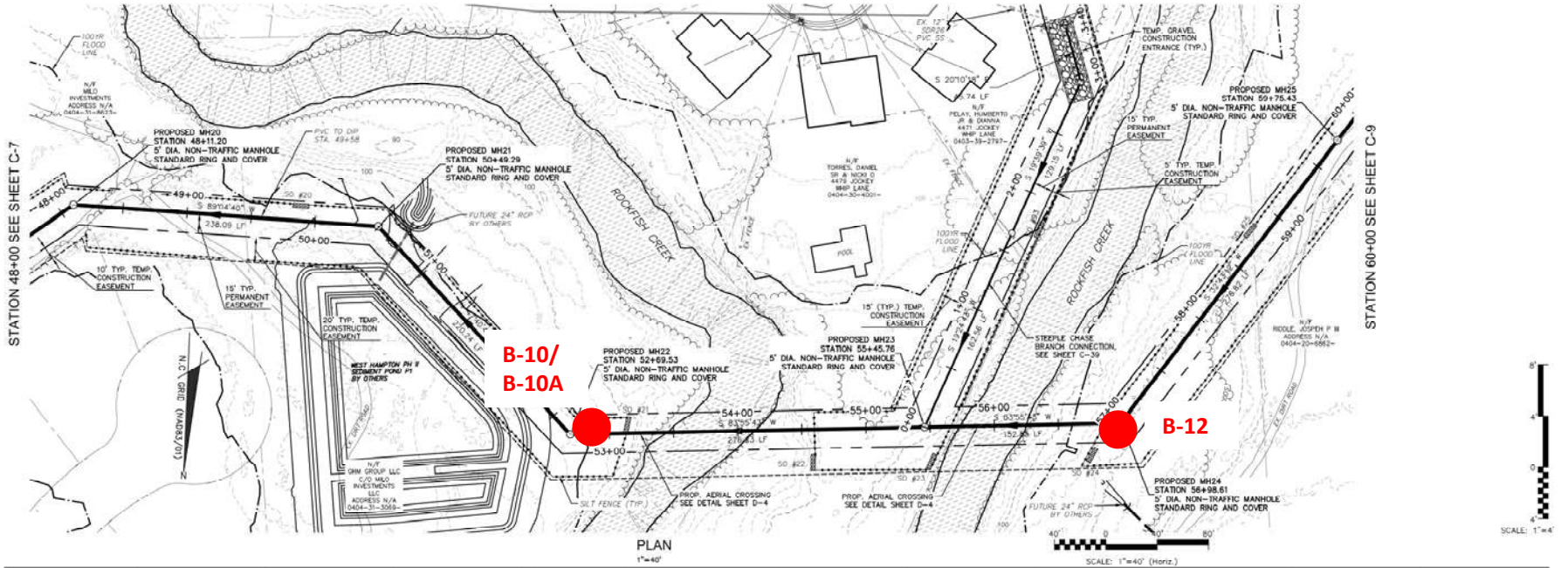
FIGURES



SITE VICINITY MAP North

FROEHLING & ROBERTSON, INC.
Engineering Stability Since 1881
310 Hubert Street
Raleigh, North Carolina 27603-2302 | USA
T 919.828.3441 | F 919.828.5751
www.fandr.com

CLIENT: W.K. Dickson	
PROJECT: Big Rockfish Creek Outfall Aerial Crossings	
LOCATION: Fayetteville, North Carolina	
F&R PROJECT No.: 66W-0027	FIGURE No.: 1
DRAWN BY: M. Kayser	
DATE: March 2020	SCALE: Not to Scale



● Approximate Boring Location

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Raleigh, North Carolina 27603-2302|USA
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www.fandr.com

BORING LOCATION PLAN

CLIENT: W.K. Dickson		
PROJECT: Big Rockfish Creek Outfall Aerial Crossings		
LOCATION: Fayetteville, North Carolina		
F&R PROJECT No: 66W-0027		FIGURE No.: 2
DRAWN BY: M. Kayser	CHECKED BY: W. P. Alton, P.E.	
DATE: March 2020	SCALE: As Shown	

FROEHLING & ROBERTSON, INC.

SUBSURFACE PROFILE

Plot Based on Elevation

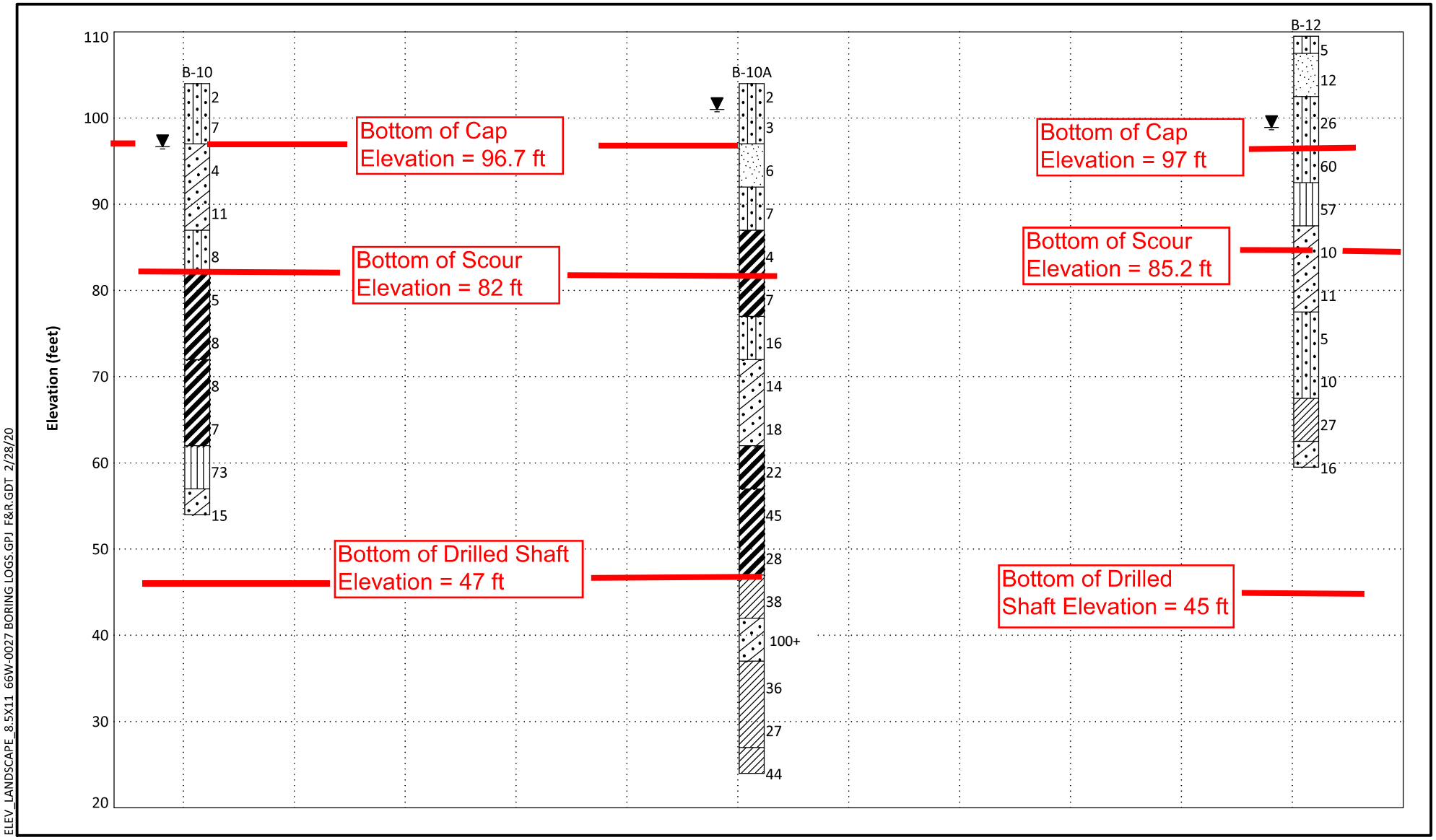
Profile Name: Figure No. 3

Project No: 66W-0027

Client: W K Dickson

Project: FPWC Big Rockfish Creek Outfall

City/State: Hope Mills, NC



ELEV_LANDSCAPE_8.5X11 66W-0027 BORING LOGS.GPJ F&R.GDT 2/28/20

APPENDIX II

BORING LOGS

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

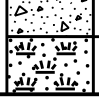
The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		ALLUVIAL: Very Loose to Loose, Gray, Moist, Very Silty Fine SAND (SM)	2-1-1	0.0		GROUNDWATER DATA: 0 Hr: Groundwater Reading was Not Available Due to Mud Drilling 24 Hrs: 7.3' inside Temporary Observation Well
				1.5	2	
			3-3-4	3.5		
				5.0	7	
97.0	▼7.0	Very Loose to Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Roots and Mica	1-2-2	8.5		
				10.0	4	
			3-5-6	13.5		
				15.0	11	
87.0	17.0	COASTAL PLAIN: Loose, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Mica	2-3-5	18.5		
				20.0	8	
82.0	22.0	Firm, Brown to Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Mica	2-3-2	23.5		
				25.0	5	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type: Automatic
Date Drilled: 6/6/19
Driller: F&R Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		Firm, Brown to Dark Gray, Wet, Fine Sandy CLAY (CH) with Trace Mica	3-3-5	28.5	8	
				30.0		
72.0	32.0	Firm, Gray, Wet, Fine Sandy Very Silty CLAY (CH) with Mica	3-4-4	33.5	8	
				35.0		
			2-3-4	38.5	7	
				40.0		
62.0	42.0	Very Hard, Gray, Wet, Fine Very Sandy SILT (ML) with Trace Mica	10-33-40	43.5	73	
				45.0		
57.0	47.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Coarse SAND (SC) with Trace Fine Gravel	3-5-10	48.5	15	
54.0	50.0	Boring Terminated at 50 feet.		50.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10A (1 of 3)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104 ±
Total Depth: 80.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/25/20
Driller: F&R Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		ALLUVIAL: Very Loose, Tan to Gray, Moist to Wet, Very Silty Fine SAND (SM) with Trace Roots and Fine Gravel (1.0'-7.0')	WOH-1-1	0.0 1.5	2	GROUNDWATER DATA: 0 Hr: 24 Hrs: 3.0', Caved at 3.6'
		Wet from 3.5'-7'	1-2-1	3.5 5.0	3	
97.0	7.0	Loose, Gray, Saturated, Fine to Medium SAND (SP) with Trace Silt	3-3-3	8.5 10.0	6	
92.0	12.0	Loose, Light Gray, Wet, Slightly Clayey Very Silty Fine SAND (SM)	3-4-3	13.5 15.0	7	
87.0	17.0	COASTAL PLAIN: Soft to Firm, Dark Gray, Wet, Fine Sandy Silty CLAY (CH) with Trace Mica	2-2-2	18.5 20.0	4	
			3-3-4	23.5 25.0	7	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10A (2 of 3)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104 ±
Total Depth: 80.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/25/20
Driller: F&R Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
77.0	27.0	Medium Dense, Gray, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	8-7-9	28.5 30.0	16	
72.0	32.0	Medium Dense, Dark Gray, Wet, Silty Clayey Fine to Coarse SAND (SC) with Trace Mica	3-7-7	33.5 35.0	14	
			6-9-9	38.5 40.0	18	
62.0	42.0	Very Stiff, Gray, Wet, Silty CLAY (CH) with Trace Mica	6-8-14	43.5 45.0	22	
57.0	47.0	Very Stiff to hard, Dark Gray, Wet, Fine Very Sandy Silty CLAY (CH) with Trace Mica	12-20-25	48.5 50.0	45	
			8-12-16	53.5		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-10A (3 of 3)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 104 ±
Total Depth: 80.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/25/20
Driller: F&R Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		Very Stiff to hard, Dark Gray, Wet, Fine Very Sandy Silty CLAY (CH) with Trace Mica		55.0	28	
47.0	57.0	Very Stiff, Dark Gray, Moist, Silty CLAY (CL)	10-17-21	58.5	38	
				60.0		
42.0	62.0	Very Dense, Dark Gray, Moist, Silty Clayey Fine to Medium SAND (SC)	24-59-41/3"	63.5	100+	
				64.8		
37.0	67.0	Very Stiff to Hard, Gray, Wet, Fine Very Sandy Silty CLAY (CL) with Mica	10-18-18	68.5	36	
				70.0		
			8-13-14	73.5	27	
				75.0		
27.0	77.0	Hard, Dark Gray, Moist, Fine Sandy Silty CLAY (CL)	11-20-24	78.5	44	
24.0	80.0	Boring Terminated at 80 feet.		80.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-12 (1 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 109.5 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type: Automatic
Date Drilled: 7/25/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		ALLUVIAL: Loose, Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	2-1-4	0.0	5	GROUNDWATER DATA: 0 Hr: Groundwater Reading was Not Available Due to Mud Drilling 24 Hrs: 10.6' inside Temporary Observation Well
				1.5		
107.5	2.0	Medium Dense, Brown, Wet, Medium to Coarse SAND (SP) with Trace Silt and Fine Gravel	6-6-6	3.5	12	
				5.0		
102.5	7.0	COASTAL PLAIN: Medium Dense to Very Dense, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	10-12-14	8.5	26	
				10.0		
			15-26-34	13.5	60	
				15.0		
92.5	17.0	Very Hard, Gray, Moist, Fine Sandy Clayey SILT (ML)	14-26-31	18.5	57	
				20.0		
87.5	22.0	Loose to Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Mica	4-4-6	23.5	10	
				25.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON, INC.

BORING LOG

Boring: B-12 (2 of 2)

Project No: 66W-0027
Client: W K Dickson
Project: FPWC Big Rockfish Creek Outfall
City/State: Hope Mills, NC

Elevation: 109.5 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type: Automatic
Date Drilled: 7/25/19
Driller: F&R Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		Loose to Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Mica	4-4-7	28.5	11	
				30.0		
77.5	32.0	Loose, Gray, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	2-2-3	33.5	5	
				35.0		
			5-5-5	38.5	10	
				40.0		
67.5	42.0	Very Stiff, Gray-Brown, Wet, Fine to Medium Sandy Silty CLAY (CL) with Trace Mica	6-10-17	43.5	27	
				45.0		
62.5	47.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Mica	5-6-10	48.5	16	
59.5	50.0	Boring Terminated at 50 feet.		50.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

LABORATORY TEST RESULTS

PRISM LABORATORIES, INC.
Full-Service Analytical & Environmental Solutions

NC Certification No. 402
NC Drinking Water Cert No. 37735
SC Certification No. 99012

Case Narrative

7/23/19 11:09

Froehling & Robertson, Inc. (Raleigh)
Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Lab Submittal Date: 07/05/2019
Prism Work Order: 9070076

This data package contains the analytical results for the project identified above and includes a Case Narrative, Sample Results and Chain of Custody. Unless otherwise noted, all samples were received in acceptable condition and processed according to the referenced methods.

Data qualifiers are flagged individually on each sample. A key reference for the data qualifiers appears at the end of this case narrative.

Narrative Notes:

ORP analysis was subcontracted to GCAL. Resistivity and Sulfide was subcontracted to AES.
Laboratory reports are attached.

Prism Summary of Detections does not include subcontracted data.

Please call if you have any questions relating to this analytical report.

Respectfully,

PRISM LABORATORIES, INC.

DRAFT REPORT

DATA SUBJECT TO CHANGE

Reviewed By DRAFT REPORT

VP Laboratory Services

Data Qualifiers Key Reference:

HA	Sample analyzed outside of hold time.
HT	Sample received and analyzed outside of the hold time.
BRL	Below Reporting Limit
MDL	Method Detection Limit
RPD	Relative Percent Difference
*	Results reported to the reporting limit. All other results are reported to the MDL with values between MDL and reporting limit indicated with a J.

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Sample Receipt Summary

07/23/2019

Prism Work Order: 9070076

Client Sample ID	Lab Sample ID	Matrix	Date/Time Sampled	Date/Time Received
B-2(S-4,13.5'-15')/B-13(S-4,13-5'-15')	9070076-01	Solid	06/06/19 0:00	07/05/19 13:40
B-3(13.5'-15',18-5'-20')	9070076-03	Solid	06/05/19 0:00	07/05/19 13:40
B-10(8.5'-10',13.5'-15')	9070076-04	Solid	06/06/19 0:00	07/05/19 13:40
B-11(3.5'-5',8.5'-10')	9070076-05	Solid	06/25/19 0:00	07/05/19 13:40
B-34(8.5'-10',13.5'-15')	9070076-06	Solid	06/27/19 0:00	07/05/19 13:40
B-53(3.5'-5',8.5'-10')	9070076-07	Solid	06/26/19 0:00	07/05/19 13:40
B-54(8.5'-10',13.5'-15')	9070076-08	Solid	06/26/19 0:00	07/05/19 13:40
B-55(8.5'-10',13.5'-15')	9070076-09	Solid	06/26/19 0:00	07/05/19 13:40
B-74(8.5'-10',13.5'-15')	9070076-10	Solid	06/24/19 0:00	07/05/19 13:40
B-77(18.5'-20',23.5'-25')	9070076-12	Solid	06/25/19 0:00	07/05/19 13:40
B-78(13.5'-15',18-5'-20')	9070076-13	Solid	06/25/19 0:00	07/05/19 13:40
B-79(8.5'-10',13.5'-15')	9070076-14	Solid	06/25/19 0:00	07/05/19 13:40

Samples were received in good condition at 2.6 degrees C unless otherwise noted.

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

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Laboratory Report

07/23/2019

Froehling & Robertson, Inc. (Raleigh)
Attn: Mohammad Kayser
310 Hubert Street
Raleigh, NC 27603

Project: FAYPWC Big Rockfish Creek Outfall

Sample Matrix: Solid

Client Sample ID: B-10(8.5'-10',13.5'-15')
Prism Sample ID: 9070076-04
Prism Work Order: 9070076
Time Collected: 06/06/19 00:00
Time Submitted: 07/05/19 13:40

Parameter	Result	Units	Report Limit	MDL	Dilution Factor	Method	Analysis Date/Time	Analyst	Batch ID
Anions by Ion Chromatography									
Chloride	BRL HA	mg/kg dry	29	8.5	1	*9056A	7/12/19 18:21	BMS	P9G0169
Sulfate	**320 HA**	**mg/kg dry**	**180**	**51**	**1**	***9056A**	**7/12/19 18:21**	**BMS**	**P9G0169**
General Chemistry Parameters									
% Solids	**85.1 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**
pH	**4.0**	**pH Units**			**1**	***9045D**	**7/9/19 12:34**	**CBM**	**P9G0138**
% Moisture	**14.9 HT**	**% by Weight**	**0.100**	**0.100**	**1**	***SM2540 G**	**7/10/19 9:20**	**KBS**	**P9G0141**

449 Springbrook Road - P.O. Box 240543 - Charlotte, NC 28224-0543
Phone: 704/529-6364 - Toll Free Number: 1-800/529-6364 - Fax: 704/525-0409

IRT-14 2.5 2.6

PRISM LABORATORIES, INC.

Full Service Analytical & Environmental Solutions

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543
Phone: 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2 QUOTE # TO ENSURE PROPER BILLING: 66W-0027

Client Company Name: F&R
Report To/Contact Name: MOHAMMAD KAYSER
Reporting Address: 310, HUBERT STREET RALEIGH, NC, 27606
Phone: 919-719-1845 Fax (Yes) (No): ____
Email (Yes) (No) Email Address ____
EDD Type: ____ PDF ✓ Excel ____ Other
Site Location Name: FAYETTVILLE
Site Location Physical Address: VARIOUS

Project Name: FAYPWC Big Rockfish Creek Outfall
Short Hold Analysis: (Yes) (No) UST Project: (Yes) (No)
*Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements
Invoice To: F&R
Address: 310 HUBERT STREET, RALEIGH, NC, 27606
Purchase Order No./Billing Reference 66W-0027
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☐ Standard 10 days
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY PRISM LABORATORIES, INC. TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	✓		
Received ON WET ICE? Temp ____			
PROPER PRESERVATIVES indicated?	✓		
Received WITHIN HOLDING TIMES?	✓		
CUSTODY SEALS INTACT?			✓
VOLATILES rec'd W/OUT HEADSPACE?			✓
PROPER CONTAINERS used?	✓		

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL
Certification: NELAC ____ USACE ____ FL ____ NC ____ SC ____ OTHER ____ N/A ____
Water Chlorinated: YES ____ NO ____
Sample Iced Upon Collection: YES ____ NO ____

CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSES REQUESTED: Moisture Content	pH	Chloride	Sulfate	Electrical Resistivity	Redox	Sulfide	REMARKS	PRISM LAB ID NO.
B-2 (5-4, 13.5-15)	6/6/19		SOIL	G				↓	↓	↓	↓	↓	↓	↓		01/02
B-13 (5-4, 13.5-15)	6/11/19															
B-3 (13.5-15, 18.5-20)	6/5/19	~~0151~~														03
B-10 (8.5-10, 13.5-15)	6/6/19															04
B-11 (3.5-5, 8.5-10)	6/25/19															05
B-34 (8.5-10, 13.5-15)	6/27/19															06
B-53 (3.5-5, 8.5-10)	6/26/19															07
B-54 (8.5-10, 13.5-15)	6/26/19															08
B-55 (8.5-10, 13.5-15)	6/26/19															09
B-74 (8.5-10, 13.5-15)	6/24/19															10
B-75 (3.5-5, 8.5-10)	6/24/19															11

Sampler's Signature ____ Sampled By (Print Name) ____ Affiliation ____

PRESS DOWN FIRMLY - 3 COPIES

Upon relinquishing, this Chain of Custody is your authorization for Prism to proceed with the analyses as requested above. Any changes must be submitted in writing to the Prism Project Manager. There will be charges for any changes after analyses have been initialized.

		Date	Military/Hours
Relinquished By: (Signature) F.A. KAYSER	Received By: (Signature)	07/03/19	12:51
Relinquished By: (Signature)	Received By: (Signature)	7-5-19	11:00
Relinquished By: (Signature)	Received For Prism Laboratories By:	7-5-19	13:40

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Prism Field Service ☐ Other ____

Log-In Group No. 9070076

Additional Comments: 10 Composite samples

PRISM USE ONLY
Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES:	UST:	GROUNDWATER:	DRINKING WATER:	SOLID WASTE:	RCRA:	CERCLA	LANDFILL	OTHER:
☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____	☐ NC ☐ SC ☐ ____

*CONTAINER TYPE CODES: A = Amber C = Clear G = Glass P = Plastic; TL = Teflon-Lined Cap VOA = Volatile Organics Analysis (Zero Head Space)

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT

Prism Laboratories
PO Box 240543
Charlotte NC 282240543

ATTENTION
Angela Overcash

PROJECT ID
9070076

LABORATORY REPORT NUMBER
1907819

DATE
July 17, 2019

Primary Data Review By

Chris Pafford
Project Manager, AES

Secondary Data Review By

Ashley Amick

Project Manager, Access Analytical
aamick@axs-inc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Analytical Environmental Services Inc. (AES Inc), 3080 Presidential Drive, Atlanta, GA 30340.**
- **AES is SCDHEC certified laboratory # 98016, NCDENR certified lab # 562, GA certified lab # FL-E87582, NELAP certified laboratory # E87582**
- **AIHA-LAP,LLC Laboratory ID:100671 for Industrial Hygiene samples (Organics, Metals, PCM Asbestos, Gravimetric), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) Direct Examination.**
- Local support services for this project are provided by Access Analytical, Inc. Access Analytical is a representative of AES serving client in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll fee at 883.315.4243

1907819

PRISM LABORATORIES, INC. | Full-Service Analytical & Environmental Solutions

SUBCONTRACT ORDER

Prism Laboratories, Inc.

9070076

Certification: NELAC___ USACE___
NC___ SC___ Other _____
N/A ✓

SENDING LABORATORY:

Prism Laboratories, Inc.
P. O. Box 240543
Charlotte, NC 28224-0543
Phone: 800-529-6364
Fax: 704-525-0409
Project Manager: Angela D. Overcash

RECEIVING LABORATORY:

Analytical Environmental Services, Inc.
3080 Presidential Parkway
Atlanta, GA 30340
Phone :(770) 457-8177
Fax: NA

5 day TAT

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 9070076-01	**Solid**	**Sampled:06/06/19 00:00**	B-2 / B-13	
Sulfide (Sub)		06/13/19 00:00		
Resistivity (Sub)		07/04/19 00:00		
Containers Supplied:				
1x 4oz jar				
Sample ID: 9070076-03	**Solid**	**Sampled:06/05/19 00:00**	B-3	
Resistivity (Sub)		07/03/19 00:00		
Sulfide (Sub)		06/12/19 00:00		
Containers Supplied:				
Sample ID: 9070076-04	**Solid**	**Sampled:06/06/19 00:00**	B-10	
Resistivity (Sub)		07/04/19 00:00		
Sulfide (Sub)		06/13/19 00:00		
Containers Supplied:				
Sample ID: 9070076-05	**Solid**	**Sampled:06/25/19 00:00**	B-17	
Resistivity (Sub)		07/23/19 00:00		
Sulfide (Sub)		07/02/19 00:00		
Containers Supplied:				

Released By	Date	Received By	Date
Jalon Uf Fedex	7.9.19	Fedex	
Released By	Date	Received By	Date
		Aneem D Peters	7-10-19 9:50
Released By	Date	Received By	Date
Released By	Date	Received By	Date

Analytical Environmental Services, Inc **Date:** 17-Jul-19

Client:	Prism Laboratories	**Client Sample ID:**	B-10
Lab Order	1907819	**Tag Number:**	9070076-04
Project Name:	9070076	**Collection Date:**	6/6/2019 12:00:01 AM
Lab ID:	1907819-003A	**Matrix:**	Solid

Analyses	Result	Qual	MDL	Reporting Limit	Units	BatchID	DF	Date Analyzed	Analyst
Sulfide by SW9030B/9034					**(SW9030B)**				
Sulfide	BRL	H	37.3	44.4	mg/Kg-dry	281948	1	07/12/2019 17:25	AT
Soil Resistivity SW9050A					**(SW9050A)**				
Resistivity (@100% Moisture Saturation)	5850	H	0	0	ohms*cm	281486	1	07/16/2019 13:15	CG
PERCENT MOISTURE D2216									
Percent Moisture	14.1		0	0	wt%	R402404	1	07/11/2019 00:00	JW

Qualifiers:

- * Value exceeds maximum contaminant level
- BRL Not Detected at MDL
- H Holding times for preparation or analysis exceeded
- N Analyte not NELAC certified
- B Analyte detected in the associated method blank
- E Estimated value above quantitation range
- S Spike Recovery outside limits due to matrix
- > Greater than Result value
- J Estimated value detected below Reporting Limit
- < Less than Result value

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Prism Laboratories, Inc.
PO BOX 240543
Charlotte, NC 28224

ATTENTION
Angela Overcash

PROJECT ID
9070076

LABORATORY REPORT NUMBER
219071016

DATE
07/18/2019

Primary Data Review By

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 Innovation Park Dr., Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

GCAL
ANALYTICAL LABORATORIES, LLC

LELAP CERTIFICATE NUMBER: 01955
DOD-ELAP ACCREDITATION NUMBER: 74960

ANALYTICAL RESULTS

PERFORMED BY

GCAL, LLC
7979 Innovation Park Dr.
Baton Rouge, LA 70820
(225) 769-4900

Report Date 07/18/2019

GCAL Report 219071016

Project 9070076

Deliver To	*Additional Recipients*
Angela Overcash Prism Laboratories, Inc. PO BOX 240543 Charlotte, NC 28224 706-529-6364	NONE

PJLA Testing DoD ELAP

ISO 17025

NELAP ACCREDITED TNI LABORATORY

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations that may be Utilized in this Report

ND	Indicates the result was Not Detected at the specified reporting limit
NO	Indicates the sample did not ignite when preliminary test performed for EPA Method 1030
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
RE	Re-analysis
CF	HPLC or GC Confirmation
00:01	Reported as a time equivalent to 12:00 AM

Reporting Flags that may be Utilized in this Report

J or I	Indicates the result is between the MDL and LOQ
J	DOD flag on analyte in the parent sample for MS/MSD outside acceptance criteria
U	Indicates the compound was analyzed for but not detected
B or V	Indicates the analyte was detected in the associated Method Blank
Q	Indicates a non-compliant QC Result (See Q Flag Application Report)
*	Indicates a non-compliant or not applicable QC recovery or RPD – see narrative
E	Organics - The result is estimated because it exceeded the instrument calibration range
E	Metals - % diference for the serial dilution is > 10%
L	Reporting Limits adjusted to meet risk-based limit.
P	RPD between primary and confirmation result is greater than 40
DL	Diluted analysis – when appended to Client Sample ID

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with The NELAC Institute (TNI) Standard 2009 and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Authorized Signature
GCAL Report 219071016

Certifications

Certification	Certification Number
DOD ELAP	74960
Alabama	01955
Arkansas	88-0655
Colorado	01955
Delaware	01955
Florida	E87854
Georgia	01955
Hawaii	01955
Idaho	01955
Illinois	200048
Indiana	01955
Kansas	E-10354
Kentucky	95
Louisiana	01955
Maryland	01955
Massachusetts	01955
Michigan	01955
Mississippi	01955
Missouri	01955
Montana	N/A
Nebraska	01955
New Mexico	01955
North Carolina	618
North Dakota	R-195
Oklahoma	9403
South Carolina	73006001
South Dakota	01955
Tennessee	01955
Texas	T104704178
Vermont	01955
Virginia	460215
Washington	C929
USDA Soil Permit	P330-16-00234

Case Narrative

Client: Access Analytical **Report:** 219071016

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the Report Sample Summary page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21907101601	B-2/B-13	Solid	06/06/2019 00:01	07/10/2019 10:05
21907101602	B-3	Solid	06/05/2019 00:01	07/10/2019 10:05
21907101603	B-10	Solid	06/06/2019 00:01	07/10/2019 10:05
21907101604	B-11	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101605	B-34	Solid	06/27/2019 00:01	07/10/2019 10:05
21907101606	B-53	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101607	B-54	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101608	B-55	Solid	06/26/2019 00:01	07/10/2019 10:05
21907101609	B-74	Solid	06/24/2019 00:01	07/10/2019 10:05
21907101610	B-77	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101611	B-78	Solid	06/25/2019 00:01	07/10/2019 10:05
21907101612	B-79	Solid	06/25/2019 00:01	07/10/2019 10:05

Summary of Compounds Detected

B-2/B-13

Collect Date 06/06/2019 00:01 **GCAL ID** 21907101601
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	401			mV

B-3

Collect Date 06/05/2019 00:01 **GCAL ID** 21907101602
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	421			mV

B-10

Collect Date 06/06/2019 00:01 **GCAL ID** 21907101603
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	444			mV

B-11

Collect Date 06/25/2019 00:01 **GCAL ID** 21907101604
Receive Date 07/10/2019 10:05 **Matrix** Solid

HACH Method 10228 *Results Reported on Dry Weight Basis

CAS#	Parameter	Result	DL	LOQ	Units
WET-104	Oxidation Reduction Potential	458			mV

APPENDIX IV

SCOUR MEMORANDUM PREPARED BY

WK DICKSON

M E M O R A N D U M

720 Corporate Center Drive Raleigh, North Carolina 27607 919.782.0495 tel.

TO: **File**

FROM: **Scott Sigmon, PE, Kim Marsh, EI**

DATE: **October 10, 2019**

RE: **DRAFT Pier Scour Analysis for Big Rockfish Creek Outfall 20180007.01.RA**

Draft Scour Analysis

Pier scour was evaluated for the Big Rockfish Creek Outfall project at two locations (plan sheet C-8 dated 7-24-2019 at stations 54+00 & 56+00) using the U.S. Department of Transportation Federal Highway Administration *Publication No. FHWA-HIF-12-003 Hydraulic Engineering Circular No. 18* dated April 2012. The pier scour was analyzed for the 24" sewer effluent pipe. Pier structural design has not been completed and scour calculations will need to be checked and verified following results from the structural analysis before scour calculations can be finalized.

For the purposes of establishing approximate scour depths, the calculations follow design recommendations from Attachment 1, City of Raleigh Public Utility Department standard sewer detail S-16 dated 6-1-2008 titled AERIAL PIPE CROSSING PILE SUPPORED PIER DETAIL.

Scour calculation assumptions:

- Piers were assumed to be square nosed, 1.5-ft in width.
- A width of 3.57-ft was assumed for the pipe aerial crossing.
- Maximum channel velocities were used in the calculations to account for potential migration of channel bed.
- Final scour depth includes pier and contraction scour for the respective 50-yr and 100-yr storms.
- Assumes concrete pipe support will extend through maximum scour depth of a minimum of 8.2 feet.
- Assumes footing thickness will be a minimum of 26-inches.

- Assumes square concrete precast or steel H-piles will be driven below the footing per attached detail S-16 (minimum of 15 feet or until piles develop a 30 TN capacity) to provide additional scour factor of safety.

Draft calculations are provided in Attachment 2. Reference summary tables below for scour results for the 50- and 100-year storms for both Aerial Crossings #1 and #2.

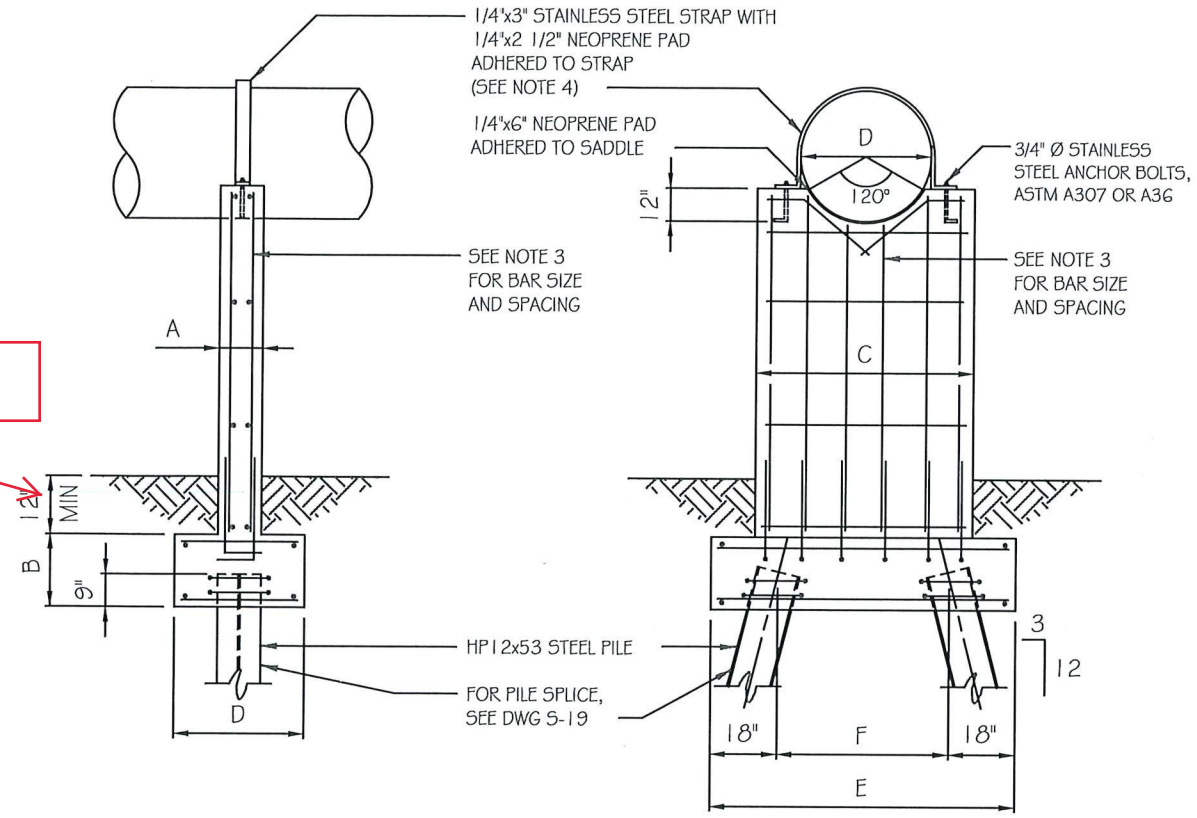
Table 1. Aerial Crossing #1 Scour Analysis for the 50- and 100-year Storm Events

Storm Event	Pier 1 Scour (ft)	Pier 2 Scour (ft)
50-year	8.2	8.2
100-year	4.6	4.6

Table 2. Aerial Crossing #2 Scour Analysis for the 50- and 100-year Storm Events

Storm Event	Pier 1 Scour (ft)
50-year	5.3
100-year	5.1

Attachment 1



Ground to top of footing = 9 feet

NOTES:

1. PILE SUPPORTED PIER FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED ON THE FOLLOWING PARAMETERS:
   MINIMUM CAPACITY OF HP12x53 PILE = 30 TONS
   CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
   GRADE 60 REINFORCING STEEL
   MAXIMUM STREAM VELOCITY = 10 FT/SEC
   IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, THE FOUNDATION DESIGN SHALL BE REVIEWED BY THE ENGINEER.

2. LENGTH OF PILES SHALL BE AS REQUIRED TO DEVELOP 30 TON CAPACITY BY EITHER END BEARING, FRICTION OR A COMBINATION OF END BEARING AND FRICTION. AS A MINIMUM, PILES SHALL BE DRIVEN AT LEAST 15 FEET INTO UNDISTURBED SOIL.

3. TWELVE-INCH AND FOURTEEN-INCH WIDE PIERS SHALL BE REINFORCED WITH #5 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. EIGHTEEN-INCH WIDE PIERS SHALL BE REINFORCED WITH #7 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. FOOTINGS SHALL BE REINFORCED TYPICALLY TO PIERS.

4. EIGHTEEN-INCH WIDE PIERS SHALL REQUIRE TWO STRAPS OVER THE PIPE INSTEAD OF ONE (AS SHOWN).

5. WHEN CONCRETE SUPPORTS ARE REQUIRED TO BE LOCATED WITHIN A STREAM AND ARE NOT COVERED WITH BACKFILL, SEE DRAWING S-19 FOR MODIFICATIONS TO UPSTREAM FACE OF SUPPORT.

CASING PIPE DIA. "D" (IN.)	PIER THICKNESS "A" (IN.)	FOOTING THICKNESS "B" (IN.)	PIER WIDTH "C" (FT.)	FOOTING WIDTH "D" (FT.)	FOOTING LENGTH "E" (FT.)	PILE SPACING "F" (FT.)
6-12	12	20	2'-4"	3'-0"	6'-0"	3'-0"
14-20	12	20	3'-0"	3'-0"	8'-0"	5'-0"
22-28	18	26	3'-8"	4'-0"	8'-9"	5'-9"
30-36	18	26	4'-4"	4'-0"	9'-0"	6'-0"
38-48	18	26	5'-4"	5'-0"	9'-6"	6'-6"
51-60	18	26	6'-4"	5'-0"	9'-10"	6'-10"

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

AERIAL PIPE CROSSING
PILE SUPPORTED PIER DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-16	D.H.L.	6/16/08		

Attachment 2

Summary of Individual Pier Scour

2018000701RA - Big Rockfish Creek Outfall

AERIAL CROSSING #1

Pier 1		Pier 2	
50YR	100YR	50YR	100YR
8.2-ft	4.6-ft	8.2-ft	4.6-ft

Assumptions: Piers were assumed to be square nosed, 1.5-ft in width. A width of 3.57-ft was assumed for the pipe aerial crossing. Maximum channel velocities were used in the calculations to account for potential migration of channel bed. Final scour depth includes pier and contraction scour for the respective 50-yr and 100-yr storms.

Pier Scour Predition Computations from HEC-18

Utilizing Equations 7.3, 7.4,7.5, 7.6, 7.7, 7.8
and Tables 7.1, 7.2 7.3

Input Cells
Output Cells

PIER 1

	50-YR STORM	Units	Notes
Units	English		
Pier Number (HEC-RAS)	1		
Pier Shape	Square Nose	ft	
Pier Length	3.57	ft	Bridge width XS 83137
Pier Width	1.5	ft	Piers @ BR83137
Upstream Flow Depth	13.68	ft	Used max depth
Upstream Average Velocity	5.66	ft/s	See 100-YR Storm
Bed Material D50	0.001377950	ft	
Angle of Attack	0	Degrees	
Bed Conditions	Small Dunes		
Dune Height	0	ft	
Upstream Froude Number	0.24		Bridge Output Table
Ku	11.17		
VcD50	1.9		
VicD50	0.9		
K1	1.1	Table 6.1	
K2	1.0	Table 6.2	
K3	1.1	Table 6.3	
Scour Depth	4.3	ft	
Scour Depth	4.3-ft		

	100-YR STORM	Units	Notes
Units	English		
Pier Number (HEC-RAS)	1		
Pier Shape	Square Nose	ft	
Pier Length	3.57	ft	Bridge width XS 83137
Pier Width	1.5	ft	Piers @ BR83137
Upstream Flow Depth	14.87	ft	Used max depth
Upstream Average Velocity	4.74	ft/s	Used the U/S flow tube with highest velocity.
Bed Material D50	0.001377950	ft	Value ascertained from F&R boring logs - high end for sand
Angle of Attack	0	Degrees	
Bed Conditions	Small Dunes		
Dune Height	0	ft	
Upstream Froude Number	0.19		Bridge Output Table
Ku	11.17		
VcD50	1.9		
VicD50	0.9		
K1	1.1	Table 6.1	
K2	1.0	Table 6.2	
K3	1.1	Table 6.3	
Scour Depth	4.0		
Scour Depth	4.0-ft		

Table 6.1. Correction Factor, K_1, for Pier Nose Shape.

Shape of Pier Nose	K_1
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose	0.9

Table 6.2. Correction Factor, K_2, for Angle of Attack, θ, of the Flow.

Angle	L/a=4	L/a=8	L/a=12
0	1.0	1.0	1.0
15	1.5	2.0	2.5
30	2.0	2.75	3.5
45	2.3	3.3	4.3
90	2.5	3.9	5.0

Angle = skew angle of flow
L = length of pier, m

Figures ada

Table 6.3. Increase in Equilibrium Pier Scour Depths, K_3, for Bed Condition.

Bed Condition	Dune Height m	K_3
Clear-Water Scour	N/A	1.1
Plane bed and Antidune flow	N/A	1.1
Small Dunes	3> H ≥ 0.6	1.1
Medium Dunes	9> H ≥ 3	1.2 to 1.1
Large Dunes	H ≥ 9	1.3

Pier Scour Predition Computations from HEC-18

Utilizing Equations 7.3, 7.4,7.5, 7.6, 7.7, 7.8
and Tables 7.1, 7.2 7.3

PIER 2

Input Cells
Output Cells

	50-YR STORM	Units	Notes
Units	English		
Pier Number (HEC-RAS)	2		
Pier Shape	Square Nose	ft	
Pier Length	33	ft	Bridge width XS 83137
Pier Width	1.5	ft	Piers @ BR83137
Upstream Flow Depth	13.68	ft	Used max depth
Upstream Average Velocity	5.66	ft/s	See 100-YR Storm
Bed Material D50	0.001377950	ft	
Angle of Attack	0	Degrees	
Bed Conditions	Small Dunes		
Dune Height	0	ft	
Upstream Froude Number	0.24		Bridge Output Table
Ku	11.17		
VcD50	1.9		
VicD50	0.9		
K1	1.1		
K2	1.0		
K3	1.1		
Scour Depth	4.3	ft	
Scour Depth	4.3-ft		

	100-YR STORM	Units	Notes
Units	English		
Pier Number (HEC-RAS)	2		
Pier Shape	Square Nose	ft	
Pier Length	33	ft	Bridge width XS 83137
Pier Width	1.5	ft	Piers @ BR83137
Upstream Flow Depth	14.87	ft	Used max depth
Upstream Average Velocity	4.74	ft/s	Used the U/S flow tube with highest velocity.
Bed Material D50	0.001377950	ft	Value ascertained from F&R boring logs - used high end for sand
Angle of Attack	0	Degrees	
Bed Conditions	Small Dunes		
Dune Height		ft	
Upstream Froude Number	0.19	Bridge Output Table	
Ku	11.17		
VcD50	1.9		
VicD50	0.9		
K1	1.1		
K2	1.0		
K3	1.1		
Scour Depth	4.0		
Scour Depth	4.0-ft		

Table 6.1. Correction Factor, K_1, for Pier Nose Shape.

Shape of Pier Nose	K_1
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose	0.9

Table 6.2. Correction Factor, K_2, for Angle of Attack, θ, of the Flow.

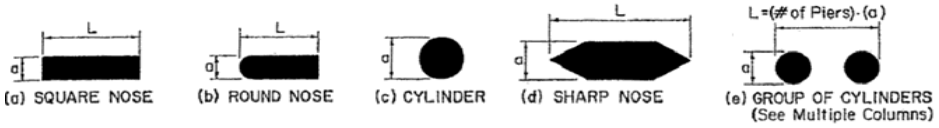
Angle	L/a=4	L/a=8	L/a=12
0	1.0	1.0	1.0
15	1.5	2.0	2.5
30	2.0	2.75	3.5
45	2.3	3.3	4.3
90	2.5	3.9	5.0

Angle = skew angle of flow
L = length of pier, m

Figures ada

Table 6.3. Increase in Equilibrium Pier Scour Depths, K_3, for Bed Condition.

Bed Condition	Dune Height m	K_3
Clear-Water Scour	N/A	1.1
Plane bed and Antidune flow	N/A	1.1
Small Dunes	3> H ≥ 0.6	1.1
Medium Dunes	9> H ≥ 3	1.2 to 1.1
Large Dunes	H ≥ 9	1.3



LIVE-BED CONTRACTION SCOUR

AERIAL CROSSING 1 - 50YR STORM

	Known
	Calculated

50-YR Storm		
Variable	**Value**	**Notes**
y_1, Average depth in the upstream main channel (ft)	13.94	Measured depth from XS83241
y_0, Existing depth in the contracted section before scour (ft)	13.68	Measured depth from XS83177
Q_1, Flow in the upstream channel transporting sediment (ft3/s)	3851	Q Channel in XS83241
Q_2, Flow in the contracted channel (ft3/s)	4856.1	Q Channel in XS83137 BR U
W_1, Bottom width of the upstream main channel that is transporting bed material (ft)	102.27	Bottom width of Channel XS83241
W_2, Bottom width of main channel in contracted section less pier width(s) (ft)	97.17	Bottom width of Channel XS83137
T, Fall velocity of bed material based on the D50 (ft/s)	0.1968	Calculated from Figure 6.8 using D50 of 0.42-mm
g, Acceleration of gravity (ft/s2)	32.2	
S_1, Slope of the energy grade line of main channel (ft/ft)	0.0006	Measured from U/S profile
Δ, Density of water (slugs/ft3)	1.94	

Variable	**Value**	**Notes**
V*, Shear velocity in the upstream section (ft/s)	0.52	Calculated from equation $(gy_1S_1)^{1/2}$
V*/T	2.64	
k_1, Exponent determined from table	0.69	
y_2, Average depth in the contracted section (ft)	17.6	Equation 6.2
y_s, Average contraction scour depth (ft)	3.9	Equation 6.3

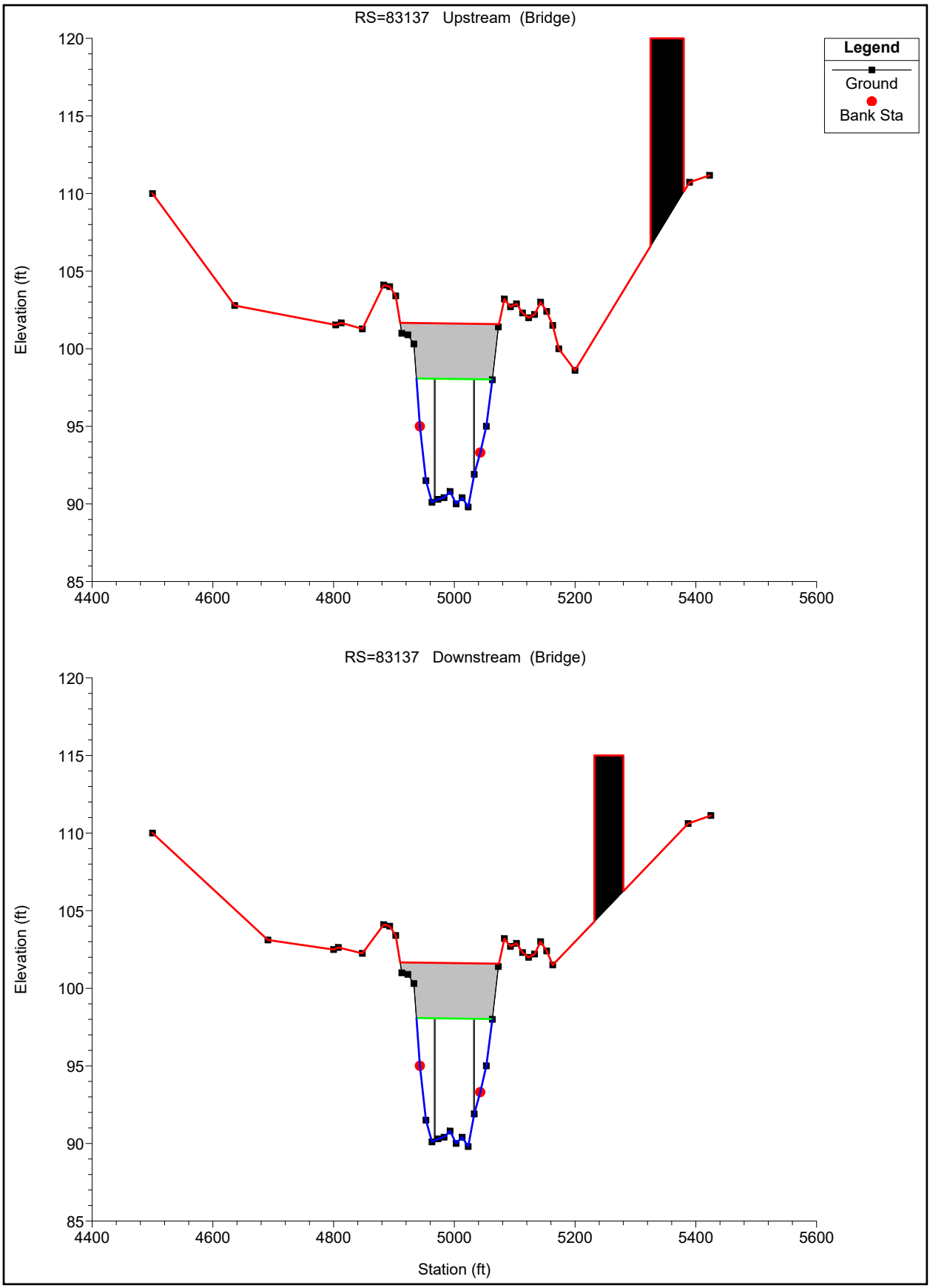
LIVE-BED CONTRACTION SCOUR

AERIAL CROSSING 1 - 100YR STORM

	Known
	Calculated

100-YR Storm		
Variable	**Value**	**Notes**
y_1, Average depth in the upstream main channel (ft)	15.13	Measured depth from XS83241
y_0, Existing depth in the contracted section before scour (ft)	14.88	Measured depth from XS83177
Q_1, Flow in the upstream channel transporting sediment (ft3/s)	4427.05	Q Channel in XS83241
Q_2, Flow in the contracted channel (ft3/s)	4366.1	Q Channel in XS83137 BR U
W_1, Bottom width of the upstream main channel that is transporting bed material (ft)	102.27	Bottom width of Channel XS83241
W_2, Bottom width of main channel in contracted section less pier width(s) (ft)	97.17	Bottom width of Channel XS83137
T, Fall velocity of bed material based on the D50 (ft/s)	0.1968	Calculated from Figure 6.8 using D50 of 0.42-mm
g, Acceleration of gravity (ft/s2)	32.2	
S_1, Slope of the energy grade line of main channel (ft/ft)	0.0006	Measured from U/S profile
Δ, Density of water (slugs/ft3)	1.94	

Variable	**Value**	**Notes**
V*, Shear velocity in the upstream section (ft/s)	0.54	Calculated from equation $(gy_1S_1)^{1/2}$
V*/T	2.75	
k_1, Exponent determined from table	0.69	
y_2, Average depth in the contracted section (ft)	15.5	Equation 6.2
y_s, Average contraction scour depth (ft)	0.6	Equation 6.3


RS=83137 Upstream (Bridge)
Legend
Ground
Bank Sta
Elevation (ft)
120
115
110
105
100
95
90
85
4400
4600
4800
5000
5200
5400
5600
RS=83137 Downstream (Bridge)
Elevation (ft)
120
115
110
105
100
95
90
85
4400
4600
4800
5000
5200
5400
5600
Station (ft)

Plan: AC2 Rockfish Creek Reach-1 RS: 83137 BR U Profile: 50-year

E.G. Elev (ft)	103.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.			
W.S. Elev (ft)	103.48	Reach Len. (ft)	3.57	3.57	3.57
Crit W.S. (ft)	95.86	Flow Area (sq ft)	419.79	876.31	526.90
E.G. Slope (ft/ft)		Area (sq ft)	419.79	876.31	526.90
Q Total (cfs)	5970.00	Flow (cfs)	536.66	4856.10	565.75
Top Width (ft)	626.73	Top Width (ft)	293.70	100.00	233.04
Vel Total (ft/s)	3.27	Avg. Vel. (ft/s)	1.28	5.54	1.07
Max Chl Dpth (ft)	13.68	Hydr. Depth (ft)	1.43	8.76	2.26
Conv. Total (cfs)		Conv. (cfs)			
Length Wtd. (ft)	3.57	Wetted Per. (ft)	306.41	323.29	274.31
Min Ch El (ft)	89.80	Shear (lb/sq ft)			
Alpha	2.29	Stream Power (lb/ft s)			
Frctn Loss (ft)		Cum Volume (acre-ft)	1211.74	2548.62	1153.48
C & E Loss (ft)		Cum SA (acres)	210.16	147.35	171.27

Plan: AC2 Rockfish Creek Reach-1 RS: 83137 BR U Profile: 100-year

E.G. Elev (ft)	104.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.			
W.S. Elev (ft)	104.67	Reach Len. (ft)	3.57	3.57	3.57
Crit W.S. (ft)	96.46	Flow Area (sq ft)	804.06	995.41	815.55
E.G. Slope (ft/ft)		Area (sq ft)	804.06	995.41	815.55
Q Total (cfs)	7110.00	Flow (cfs)	1392.89	4366.10	1045.34
Top Width (ft)	694.28	Top Width (ft)	342.58	100.00	251.70
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)	1.73	4.39	1.28
Max Chl Dpth (ft)	14.87	Hydr. Depth (ft)	2.35	9.95	3.24
Conv. Total (cfs)		Conv. (cfs)			
Length Wtd. (ft)	3.57	Wetted Per. (ft)	355.37	323.29	293.01
Min Ch El (ft)	89.80	Shear (lb/sq ft)			
Alpha	2.38	Stream Power (lb/ft s)			
Frctn Loss (ft)		Cum Volume (acre-ft)	1468.45	2761.64	1367.36
C & E Loss (ft)		Cum SA (acres)	239.45	147.37	194.57

APPENDIX V

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration

FPWC- Big Rockfish Creek Outfall (BRCO), Lake Upchurch
Fayetteville, North Carolina
F&R Project No. 66W-0027-0007

Prepared For:

WK DICKSON
community infrastructure consultants

720 Corporate Center Drive
Raleigh, North Carolina 27607

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

July 20, 2022

FROEHLING & ROBERTSON

Engineering Stability Since 1881

July 20, 2022

Mr. Monroe Huckaby, P.E.
Project Manager
WK Dickson & Co., Inc.
720 Corporate Center Drive
Raleigh, North Carolina 27607

Subject: Report of Subsurface Exploration
FPWC- Big Rockfish Creek Outfall (BRCO), Lake Upchurch
Fayetteville, North Carolina
F&R Project No. 66W-0027-0007

Dear Mr. Huckaby:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration for the above-referenced project in Fayetteville, North Carolina. Our services were performed in general accordance with F&R's Proposal 1966-00042(BRC)SUPP2 dated May 16, 2022. The attached report presents our understanding of the project, reviews our exploration procedures, describes general subsurface conditions, and presents our geotechnical evaluations and recommendations for design and construction of the project.

We have enjoyed working with you on this project. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,

FROEHLING & ROBERTSON, INC.

Meredith Ambrose, G.I.T.
Geologist

W. Patrick Alton, P.E.
Senior Geotechnical Engineer

TABLE OF CONTENTS

APPENDICES

1.0 SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in selected areas of the sewer alignment that were previously investigated in 2019 in order to provide a comparison with the current groundwater levels and soil moisture conditions.

F&R's scope of services included the following:

- Completion of 13 hand auger borings (HA-19, HA-20, HA-25, HA-27, HA-29, HA-31, HA-32, HA-34, HA-36, HA-37A, HA-37B, HA-39, and HA-40) to depths ranging from 1.5 to 11.5 feet below the existing ground surface;
- Preparation of typed hand auger logs and development of subsurface profiles;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing a geotechnical engineering evaluation of the current groundwater levels and soil moisture conditions with regard to their suitability for the proposed construction; and
- Preparation of this data report by a professional engineer.

As you are aware, F&R previously performed a subsurface exploration in April and June 2019 that included performing 23 Standard Penetration Test (SPT) borings (B-19 to B-40 and B-36A) in this area of the project to depths ranging from 15 to 30 feet. This data was submitted as part of the *FAYPWC – Big Rockfish Creek Outfall, Report of Subsurface Exploration & Geotechnical Engineering Evaluation* dated August 12, 2019. These previously drilled borings were performed in the vicinity of the subject portion of the project; however, this report only pertains to the 12 SPT borings (B-19, B-20, B-25, B-27, B-29, B-31, B-32, B-34, B-36, B-37, B-39, and B-40) that were drilled in proximity to the additional hand augers.

2.0 PROJECT INFORMATION & PROPOSED CONSTRUCTION

We understand the proposed sewer line construction in this portion of the project will consist of 18-inch and 24-inch diameter ductile iron pipe (DIP), primarily installed utilizing open-cut excavation techniques. At the time of our initial investigation in 2019 the water level within Lake Upchurch was lowered but has since been refilled. We understand there is concern that the current lake level, which is elevated well above the 2019 levels, will cause additional dewatering measures beyond what was originally assumed by the contractor to install the sewer line. We also understand that the elevated water levels could cause additional soils, beyond what was originally assumed by the contractor, to be wet and saturated and be difficult to place and compact as utility backfill.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced a total of 13 hand auger borings (HA-19, HA-20, HA-25, HA-27, HA-29, HA-31, HA-32, HA-34, HA-36, HA-37A, HA-37B, HA-39, and HA-40) to depths ranging from 1.5 to 11.5 feet below the ground surface as companions to the previously drilled 12 SPT borings (B-19, B-20, B-25, B-27, B-29, B-31, B-32, B-34, B-36, B-37, B-39, and B-40). The approximate locations are shown on the Boring Location Plans presented as Figures 2A to 2E in Appendix I. The hand auger locations were established in the field by F&R using a hand-held GPS unit. Ground surface

elevations at the hand auger locations were interpolated from "North Carolina's Spatial Data Download" 2021 topography. Given these methods of determination, the test boring locations and ground surface elevations should only be considered approximate.

The hand auger borings were performed to evaluate the soil composition and groundwater levels adjacent to or near the previously drilled SPT borings utilizing a 3-inch diameter bucket auger. A representative portion of soil was obtained at approximately one-foot intervals from the hand auger cuttings, sealed in an eight-ounce glass jar, labeled, and transported to our laboratory for final classification by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM D2488). The SPT boring logs and hand auger logs for the exploration are presented in Appendix II.

Groundwater level measurements were attempted in all of the test borings at the termination of drilling. Temporary groundwater observation wells were installed in all of the hand auger borings with the exception of HA-34 and HA-37A, which were backfilled immediately after drilling. The wells consisted of 1-inch diameter, hand-slotted PVC pipes installed into the selected borings. Groundwater level measurements were attempted again after a stabilization period of approximately 24-hours had elapsed after completion of drilling in the remaining borings. After obtaining 24-hour stabilized groundwater levels, the temporary observation wells were removed and all of the test borings were backfilled with soil cuttings.

3.2 LABORATORY TESTING

F&R selected 18 representative soil samples and subjected them to geotechnical index testing consisting of natural moisture content, grain size analysis, Atterberg limits determinations, and/or organic content. The purpose of the index testing was to aid in our classification of the soil samples. The laboratory testing was performed in general accordance with applicable ASTM standards, and the test results are summarized below and in Appendix III:

Sample No.	Boring No.	Depth (ft)	Natural Moisture (%)	LL	PL	PI	USCS Classification	% Gravel	% Sand	% Fines	Organic Content (%)
S-3	HA-19	4.0-5.0	5.8	-	-	-	-	-	-	-	-
S-5/6	HA-19	7.0-8.5	29.6	-	-	-	-	-	-	-	-
S-4	HA-25	3.0-6.0	11.5	32	18	14	SC	0.0	51.4	48.6	-
S-2/3	HA-27	0.5-2.5	13.1	-	-	-	-	-	-	-	-
S-5	HA-29	4.5-5.0	27.3	-	-	-	-	N/A	N/A	13.6	3.9
S-4	HA-31	4.0-5.0	11.2	-	-	-	-	0.5	66.7	32.8	-
S-5	HA-31	5.0-7.5	10.7	-	-	-	-	1.6	81.7	16.7	-
S-2/3	HA-32	0.5-3.5	8.4	-	-	-	-	-	-	-	-
S-8	HA-32	8.0-8.5	19.7	-	-	-	-	N/A	N/A	60.8	-
S-1	HA-34	0.0-2.5	16.1	-	-	-	-	-	-	-	-
S-2/3	HA-34	2.5-4.0	15.0	34	17	17	SC	0	51.3	48.7	-
S-3	B-36	8.5-10.0	10.9	36	18	18	CL	N/A	N/A	71.2	-
S-2	HA-36	1.0-2.0	16.4	-	-	-	-	-	-	-	-
S-3	B-37	8.5-10.0	29.1	68	33	35	MH	N/A	N/A	85.8	-
S-3	HA-37A	4.0-6.0	4.7	-	-	-	-	-	-	-	-
S-6	HA-37A	8.0-8.8	24.0	-	-	-	-	N/A	N/A	90.9	-
S-2/3	HA-39	1.8-6.0	6.7	-	-	-	-	-	-	-	-
S-3/4	HA-40	2.0-6.0	3.4	-	-	-	-	-	-	-	-

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project site is located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad flat plain with widely spaced low rolling hills where the near surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. It is noted that the Coastal Plain soils vary in thickness from only a few feet along the western border to over ten thousand feet in some areas along the coast.

According to the Geologic Map of North Carolina (1985), the site is located within an area mapped as Cretaceous-period deposits and is comprised of sedimentary deposits that appear to be located within the Cape Fear Formation. The Cape Fear Formation is described as yellowish gray to blueish gray sandstone and sandy mudstone with graded and laterally continuous bedding. Faint cross-bedding, feldspar, and mica are common throughout the formation.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached hand auger and boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the hand auger and boring logs presented in Appendix II of this report.

Subsurface profiles have been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profiles are presented as Figures 3 to 5 in Appendix I. Strata breaks designated on the hand auger and boring logs and subsurface profiles represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples.

4.2.2 Surficial Materials

Surficial Organic Soils were encountered in seven (7) hand auger borings (HA-29, HA-31, HA-36, HA-37A, HA-37B, HA-39, and HA-40) and three (3) SPT borings (B-20, B-27, and B-29) from the ground surface to depths ranging from 0.1 to 0.5 feet. The Surficial Organic Soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term *Surficial Organic Soil* is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil depths provided in this report should be considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of Surficial Organic Soil depths is subjective. Actual Surficial Organic Soil depths should be expected to vary.

Asphalt was encountered at the surface in borings B-27, B-29, B-36, B-37, B-39, and B-40 to a depth of 0.1 to 0.2 feet.

Surficial materials (Surficial Organic Soils, asphalt, etc.) were not encountered in the remaining 9 borings.

4.2.3 Fill/Possible Fill Soils

Existing fill or material that F&R believes may be fill (referred to as “possible fill” on the attached SPT and hand auger logs) was encountered at the ground surface in three hand auger borings (HA-19, HA-25, and HA-27), below the surficial organic soils in six hand auger borings (HA-29, HA-31, HA-36, HA-37, HA-39, and HA-40), and below asphalt pavement in six SPT borings (B-27, B-29, B-36, B-37, B-39, and B-40). Sometimes the relatively small and disturbed sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Since man-made materials, deleterious materials or other obvious evidence of fill were not encountered in the soil samples that appeared to be earth fill, some of the materials believed to be earth fill are referred to as “possible fill”. The fill or possible fill soils were encountered to depths ranging from approximately 0.5 to 7 feet, although typically observed to a depth of approximately 2 feet.

The fill and possible fill soils were encountered throughout the site, primarily along existing roadways, and consisted of sand, silty sand, and clayey sand (USCS – SP, SM, and SC) and sandy silt (USCS – ML). The majority of the fill and possible fill soils contained trace gravel and organics (roots and wood fragments) and were typically described as moist.

The N-values in the fill materials encountered in the SPT borings ranged from 7 blows per foot (bpf) to 21 bpf. Fill soils exhibiting SPT N-values of 4 bpf or less are generally indicative of fill with poor compaction, while soils exhibiting SPT N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted fill without gravel or deleterious materials would generally be expected to exhibit N-values of 9 bpf or greater.

4.2.4 Alluvial Soils

Alluvial soils are soils that have been transported and deposited by water. Four (4) hand auger borings HA-19, HA-20, HA-29, and HA-34 encountered alluvial soils at the ground surface or below the fill or possible fill soils at depths ranging from 1.5 to 7 feet below the ground surface. The alluvial soils consisted of wet and saturated silty sands (USCS – SM), and contained roots and wood fragments.

4.2.5 Coastal Plain/Native Soils

Coastal plain/native soils were encountered in the borings at the surface or below the surficial materials, fill/possible fill soils, or alluvial soils. The coastal plain/native soils typically consisted of sand, silty sand, and clayey sand (SP, SM, and SC) and low to high plasticity clays (CL and CH). Sandy silts and elastic silts (ML and MH) were encountered in borings HA-37A, B-29, B-32, B-37, and B-40.

Very loose or soft coastal plain/native soils (SPT N-values of 4 bpf or less) were encountered in five borings (B-19, B-20, B-29, B-31, and B-32) from the ground surface to depths ranging from 2 to 7 feet. A very loose soil layer was also encountered deeper in the soil profile in borings B-25 and B-34 from a depth of 7 to 12 feet below the ground surface. The majority of the remaining SPT boring soils exhibited loose to medium dense relative density for the sands with SPT N-values ranging from 5 to 25 bpf and very stiff to hard consistency for the clays with SPT N-values ranging from 18 to 40 bpf. Very hard and dense to very dense coastal plain/native soils were also encountered in six borings (B-27, B-29, B-32, B-34, B-36, and B-37) at depths ranging from 7 to 30 feet below the existing ground surface.

Wood was encountered in borings B-31 and B-37 from 12 to 14.5 feet and 14.5 to 15 feet below the ground surface, respectively.

4.3 Soil Moisture and Groundwater Conditions

Moist and/or moist/wet soils (*i.e.,* within 3 to 5 percentage points of the estimated optimum moisture content) were generally encountered within the top 3.5 to 6 feet of the soil profile. Wet and saturated (*i.e.*, more than 3 percentage points over the estimated optimum moisture content) were encountered in all hand auger and SPT borings, with the exception of B-39, at various depths from the ground surface to boring termination depths up to 30 feet.

Groundwater level measurements were attempted in all of the test borings at the termination of drilling and after a stabilization period of approximately 24-hours, with the exception of borings HA-34, HA-37A and B-34, which were backfilled immediately after drilling completion. Groundwater was encountered in all but five borings (HA-34, HA-37A, HA-37B, B-20, and B-39) at the termination of drilling at depths ranging from 1 to 12 feet below the existing ground

surface. Temporary groundwater observation wells were installed in all of the hand auger borings except HA-34 and HA-37A, and six (6) SPT borings (B-27, B-29, B-32, B-36, B-37, and B-40) in order to facilitate the obtainment of stabilized groundwater measurements. The wells consisted of 1-inch diameter, hand-slotted PVC pipes installed into the completed borings. Stabilized groundwater was encountered in 19 of the test borings, with the exception of borings HA-34, HA-37A, HA-37B, B-20, B-34, and B-39, at depth ranging from approximately 0.9 to 10.5 feet below the existing ground surface. The table below compares the groundwater levels encountered in the hand auger borings to the groundwater levels encountered in the 2019 SPT boring investigation:

Boring #	0 Hr Water Level	24 Hr Water Level	Hand Auger #	0 Hr Water Level	24 Hr Water Level
B-19	3.8', 4.5' cave	3.9', 4.5' cave	HA-19	9.0' w/ PVC	10.4' w/ PVC
B-20	Dry, 8.0' cave	Dry, 8.0' cave	HA-20	1.0' w/ PVC	0.9' w/ PVC
B-25	7.0', 12.5' cave	5.0', 7.5' cave	HA-25	6.7' w/ PVC	6.0' w/ PVC
B-27	7.5' w/ PVC	7.5' w/ PVC	HA-27	2.3' w/ PVC	3.5' w/ PVC
B-29	10.0' w/ PVC	4.5' w/ PVC	HA-29	5.2' w/ PVC	4.7' w/ PVC
B-31	4.5', 5.0' cave	4.0', 4.1' cave	HA-31	7.5' w/ PVC	7.2' w/ PVC
B-32	10.0' w/ PVC	7.5' w/ PVC	HA-32	7.5' w/ PVC	7.4' w/ PVC
B-34	4.0', 5.0' cave	FIAD	HA-34	Dry, 7.0' cave	FIAD
B-36	10.0' w/ PVC	1.0' w/ PVC	HA-36	2.8' w/ PVC	2.0' w/ PVC
B-37	12.0' w/ PVC	10.5' w/ PVC	HA-37A	Dry, 8.8' cave	FIAD
			HA-37B	Dry w/ PVC	Dry w/ PVC
B-39	Dry, 10.0' cave	Dry, 10.0' cave	HA-39A	10.0' w/ PVC	10.0' w/ PVC
B-40	5.5' w/ PVC	5.5' w/ PVC	HA-40	7.0' w/ PVC	6.7' w/ PVC

FIAD = Filled Immediately After Drilling

It should also be noted that soil moisture and groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. Due to the presence of relatively impervious silty/clayey soils noted on the project site, trapped or perched water conditions should be anticipated during periods of inclement weather and during seasonally wet periods.

5.0 ENGINEERING EVALUATION AND RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the hand auger and soil test borings performed by F&R, laboratory test results, our experience with similar projects and subsurface conditions, and the information provided to us regarding the proposed construction. It is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed construction from a geotechnical engineering perspective provided the recommendations presented in subsequent section of this report are followed throughout the design and construction phases of this project.

5.2 DEWATERING & SOIL MOISTURE

In comparing the groundwater level measurements and soil moisture conditions from the 2019 SPT borings to the most-recent data from the hand auger borings, there does not appear to be a direct correlation between the water level in Lake Upchurch and the groundwater levels and soil moisture conditions in the borings. The exception to this is the area of boring B-20/HA-20, which was located within a few feet of the lake edge. Due to the close proximity to the lake, the groundwater levels and soil moisture conditions at B-20/HA-20 do appear to have been more directly impacted from the higher lake level. However, as the distance from the lake edge increases, the groundwater levels also become impacted from other sources such as the surrounding topography, surface water flows, etc. Therefore, at the remaining boring locations, the lake level is expected to have less of an impact on the prevailing groundwater levels and soil moisture conditions.

As previously mentioned, groundwater was encountered immediately after drilling in all but five borings at depths ranging from 1 to 12 feet below the ground surface. Stabilized groundwater was encountered in 19 test borings at depths ranging from approximately 0.9 to 10.5 feet below the existing ground surface. Therefore, it is anticipated that groundwater will be encountered during sewer construction, and dewatering will be required in order to maintain drained, stable excavations and to prevent softening/loosening of the excavation subgrades. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottoms of the excavations. However, groundwater elevations will likely vary throughout the year, and will be elevated especially during the seasonally-wet months (October through April). If groundwater is encountered, dewatering may be able to be handled by sump and pumping techniques. However during periods of inclement weather, sump pits and pumping may not be sufficient to control both groundwater and surface water, and more extensive drainage/dewatering measures may be required. The method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, cofferdams, sheet piling, or other means.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavations during construction, unstable and loosened subgrade conditions could develop, which may cause excessive settlements to develop beneath the completed structures or require

additional subgrade repair (*e.g.,* densification, undercutting & replacement with washed stone, etc.). Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels during construction. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of WK Dickson and/or their agents, for specific application to the referenced project in Fayetteville, North Carolina in accordance with generally accepted geotechnical engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the subsurface exploration program, and generally-accepted geotechnical engineering practices. The evaluations and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

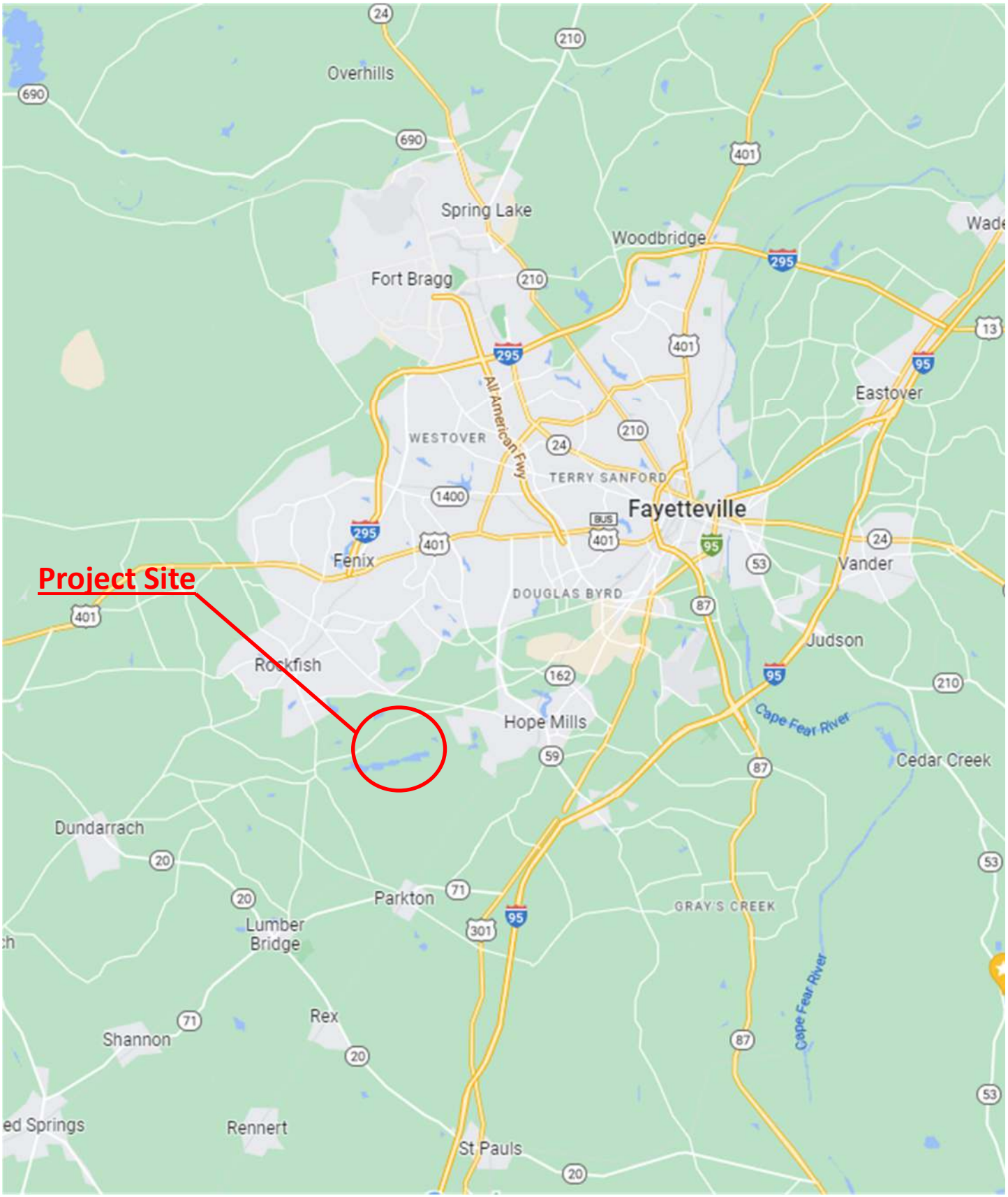
There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork activities to observe that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the proposed construction, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES



Site Vicinity Map

FROEHLING & ROBERTSON
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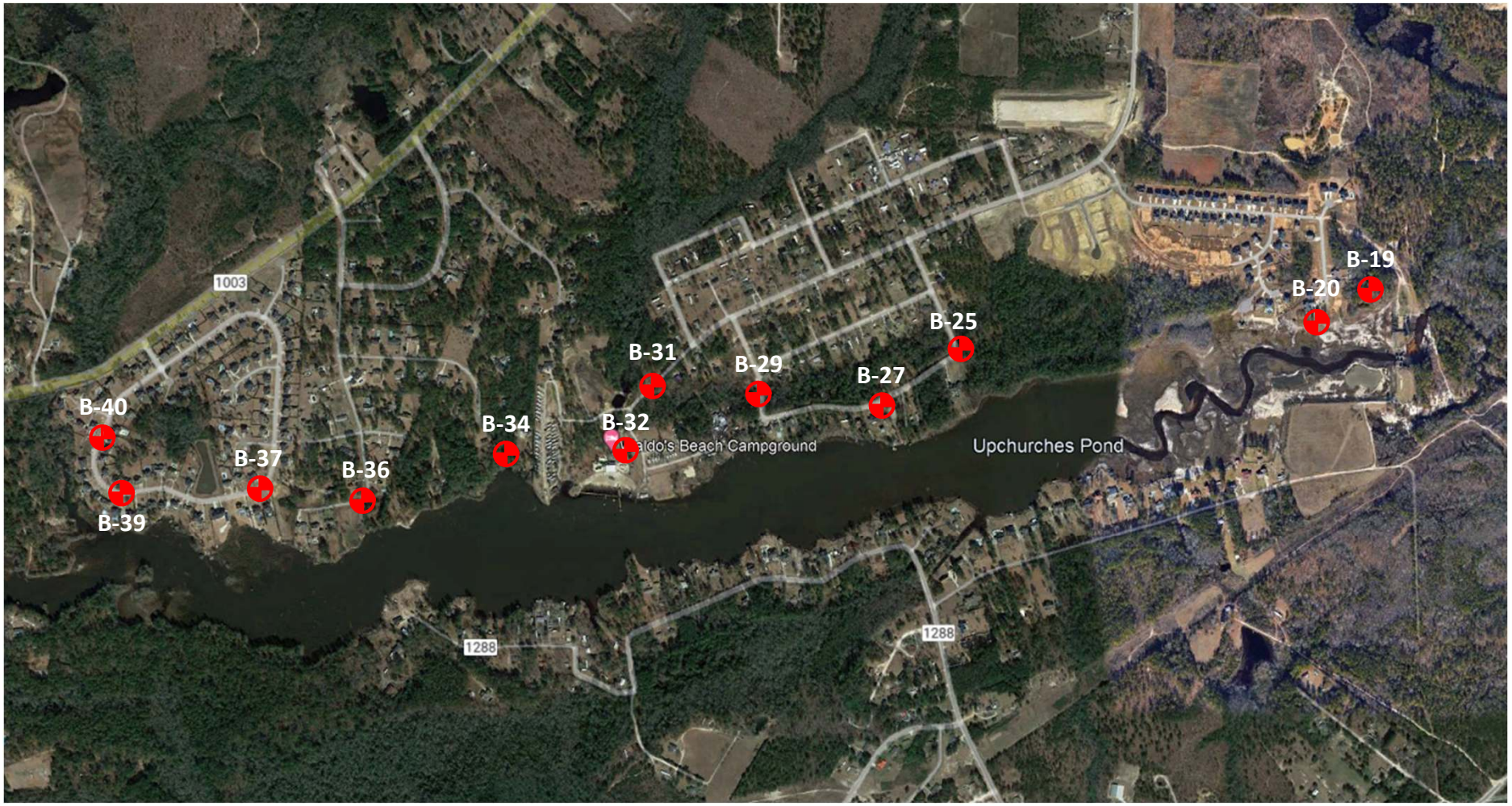
310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	W.K. Dickson		
Project:	FPWC Big Rockfish Creek Outfall, Lake Upchurch		
Location:	Fayetteville, Cumberland County, NC		
Project Number:	66W-0027-0007		FIGURE No.: 1
Drawn By:	M. Ambrose, G.I.T.		
Date:	July 2022	Scale: Not to Scale	



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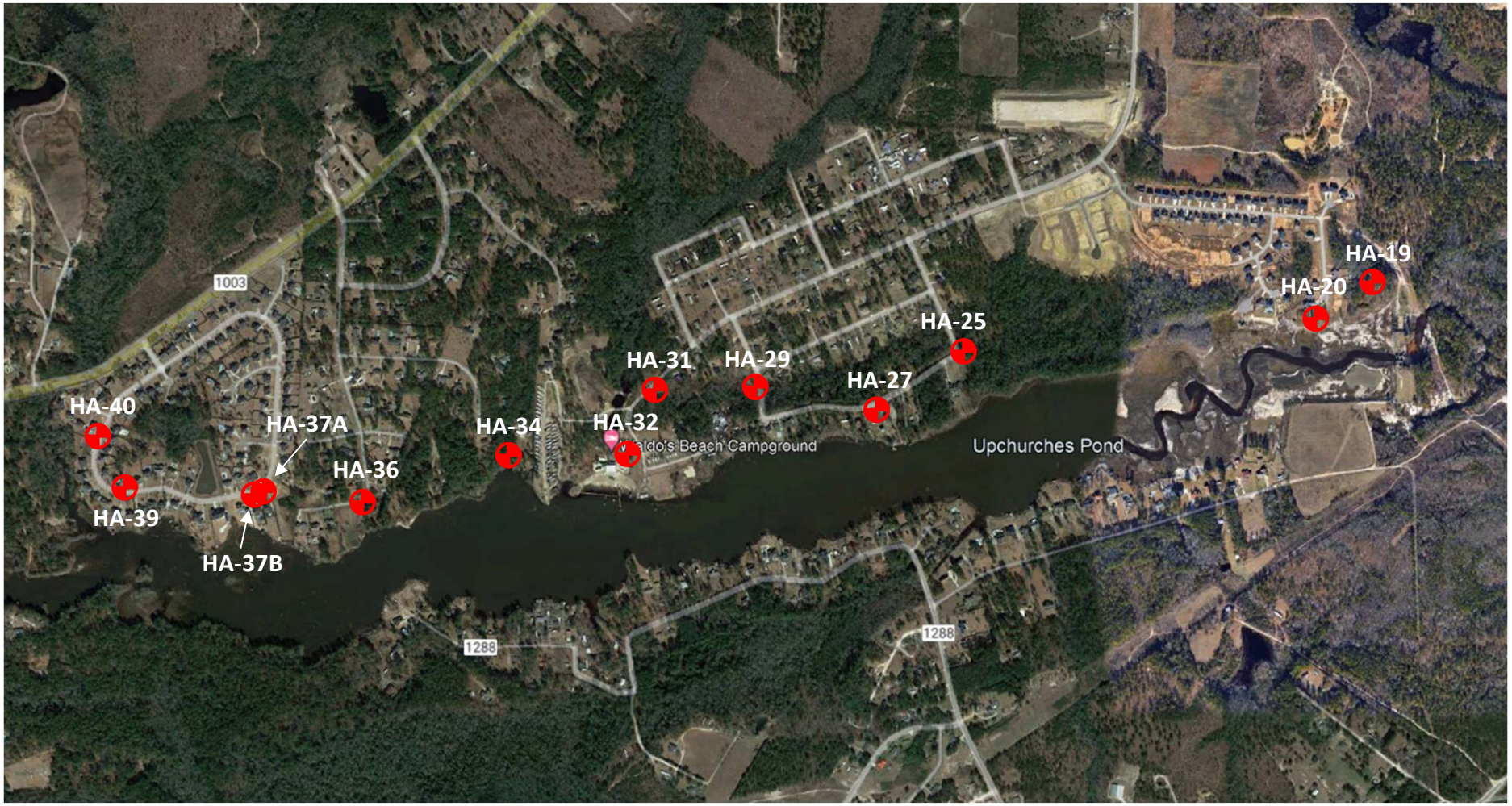
LEGEND

Approx. Boring Location

BORING LOCATION PLAN

CLIENT: W.K. Dickson & Company, Inc.		
PROJECT: FPWC BRCO, Lake Upchurch- SPT Borings (2019)		
LOCATION: Fayetteville, North Carolina		
F&R PROJECT No: 66W-0027-0007		FIGURE No.: 2A
DRAWN BY: M. Ambrose, G.I.T.	CHECKED BY: P. Alton, P.E.	
DATE: July 2022	SCALE: Not to scale	



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LEGEND

Approx. Boring Location

BORING LOCATION PLAN

CLIENT: W.K. Dickson & Company, Inc.	
PROJECT: FPWC BRCO, Lake Upchurch- Hand Auger Borings (2022)	
LOCATION: Fayetteville, North Carolina	
F&R PROJECT No: 66W-0027-0007	FIGURE No.: 2B
DRAWN BY: M. Ambrose, G.I.T.	CHECKED BY: P. Alton, P.E.
DATE: July 2022	SCALE: Not to scale

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LEGEND

Approx. Boring Location

BORING LOCATION PLAN

CLIENT: W.K. Dickson & Company, Inc.	
PROJECT: FPWC BRCO, Lake Upchurch	
LOCATION: Fayetteville, North Carolina	
F&R PROJECT No: 66W-0027-0007	FIGURE No.: 2C
DRAWN BY: M. Ambrose, G.I.T.	CHECKED BY: P. Alton, P.E.
DATE: July 2022	SCALE: Not to scale

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LEGEND

Approx. Boring Location

BORING LOCATION PLAN

CLIENT: W.K. Dickson & Company, Inc.

PROJECT: FPWC BRCO, Lake Upchurch

LOCATION: Fayetteville, North Carolina

F&R PROJECT No: 66W-0027-0007

DRAWN BY: M. Ambrose, G.I.T. | CHECKED BY: P. Alton, P.E.

DATE: July 2022 | SCALE: Not to scale

FIGURE No.: 2D

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LEGEND

Approx. Boring Location

BORING LOCATION PLAN

CLIENT: W.K. Dickson & Company, Inc.		
PROJECT: FPWC BRCO, Lake Upchurch		
LOCATION: Fayetteville, North Carolina		
F&R PROJECT No: 66W-0027-0007		FIGURE No.: 2E
DRAWN BY: M. Ambrose, G.I.T.	CHECKED BY: P. Alton, P.E.	
DATE: July 2022	SCALE: Not to scale	

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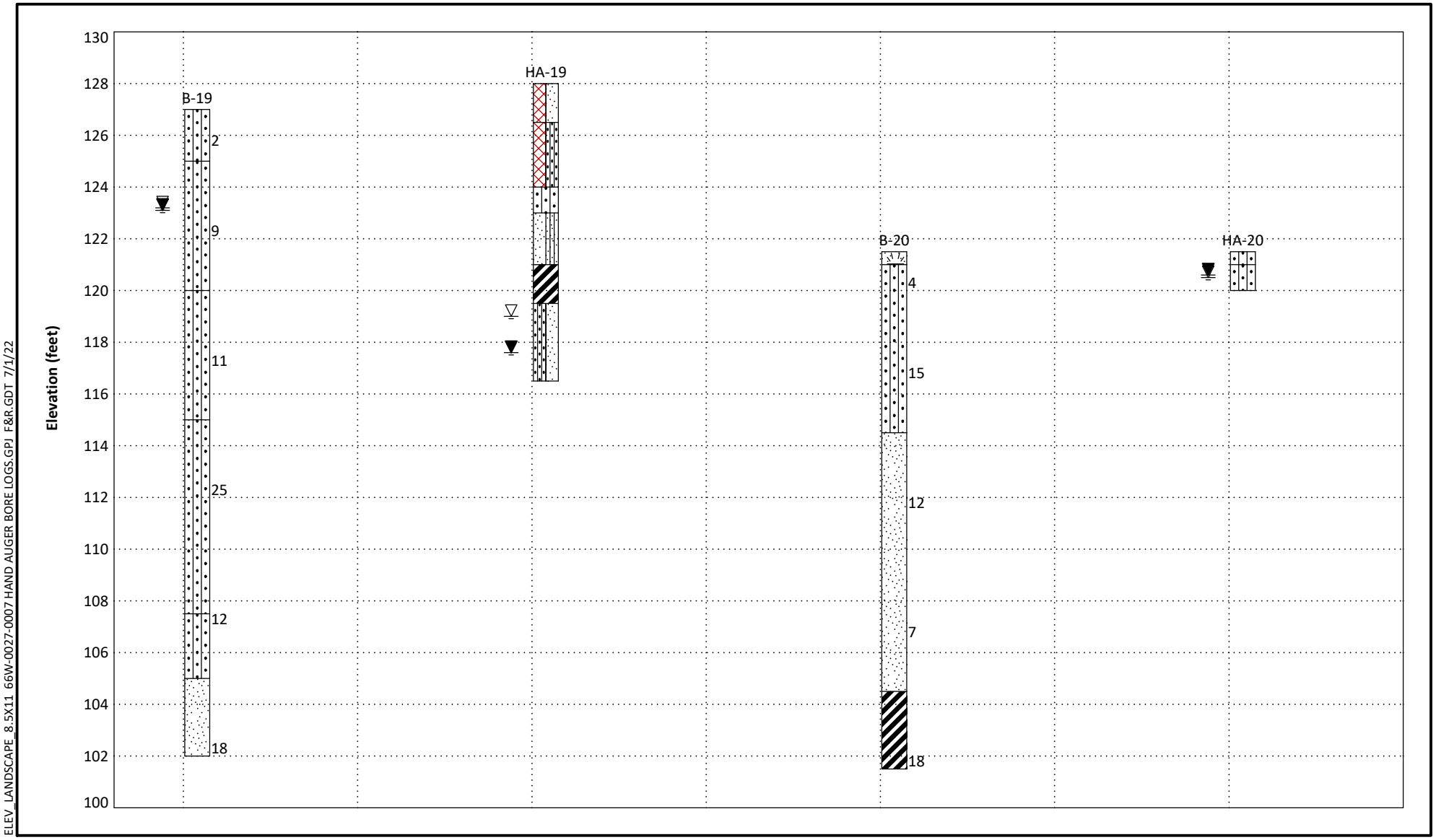
SUBSURFACE PROFILE

Plot Based on Elevation
Profile Name: Figure No. 3

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC



ELEV_LANDSCAPE_8.5X11 66W-0027-0007 HAND AUGER BORE LOGS.GPJ F&R.GDT 7/1/22

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SUBSURFACE PROFILE

Plot Based on Elevation

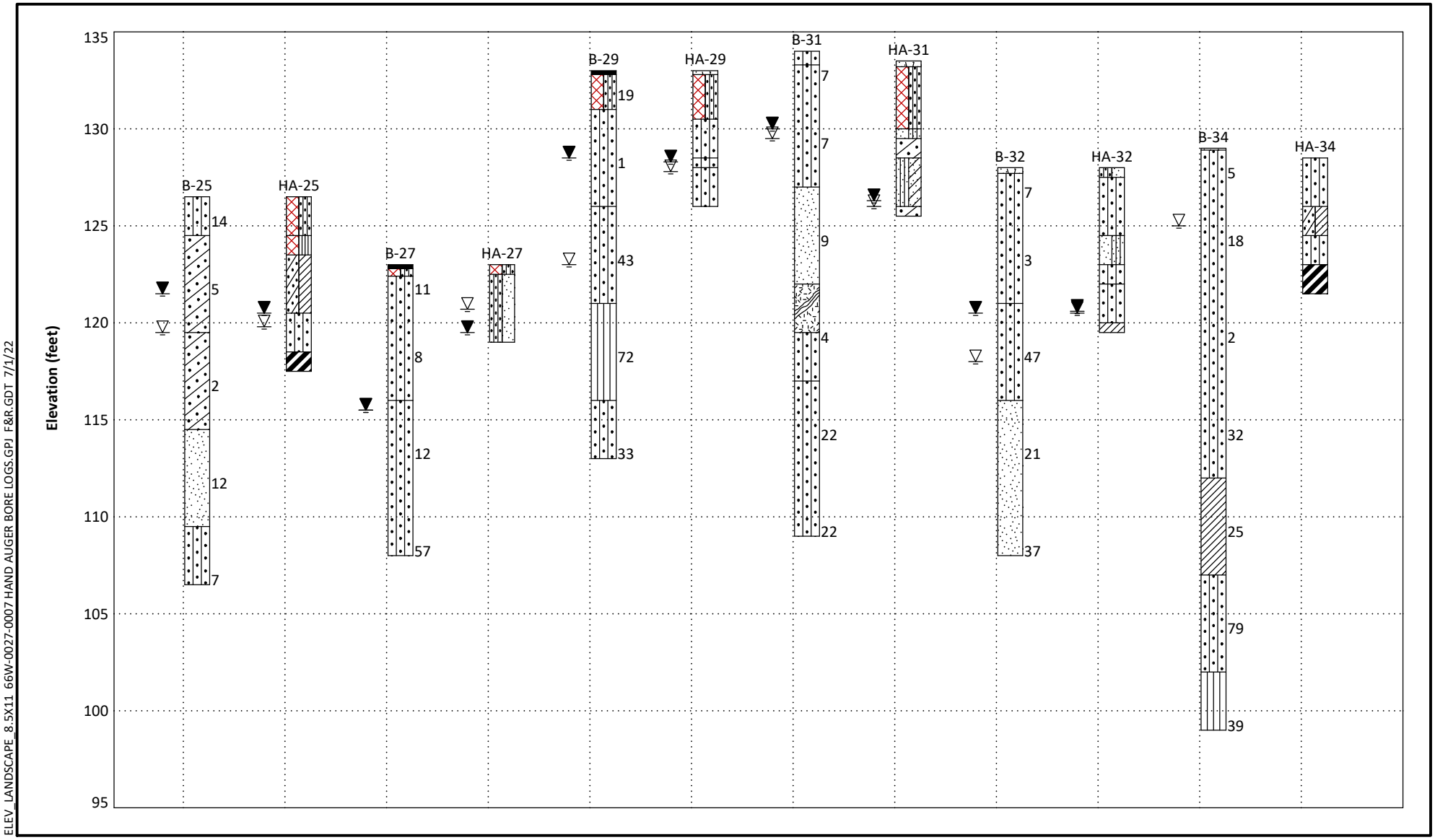
Profile Name: Figure No. 4

Project No: 66W-0027-0007

Client: WK Dickson

Project: FPWC BRCO, Lake Upchurch

City/State: Fayetteville, NC



ELEV_LANDSCAPE_8.5X11 66W-0027-0007 HAND AUGER BORE LOGS.GPJ F&R.GDT 7/1/22

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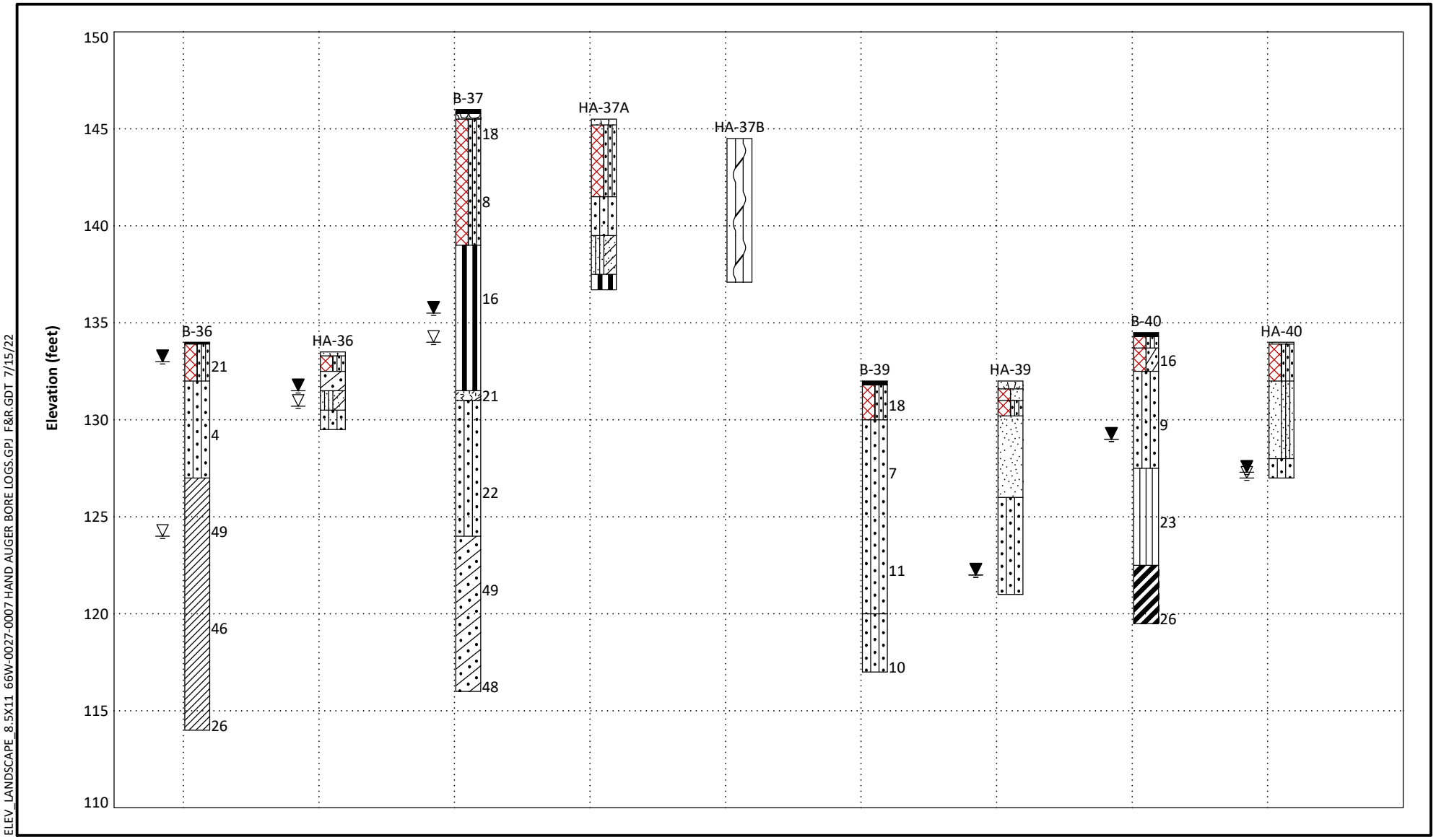
SUBSURFACE PROFILE

Plot Based on Elevation
Profile Name: Figure No. 5

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC



ELEV_LANDSCAPE_8.5X11 66W-0027-0007 HAND AUGER BORE LOGS.GPJ F&R.GDT 7/15/22

APPENDIX II

BORING LOGS

Table of Boring Coordinates
WK Dickson- FPWC BRCO, Lake Upchurch
F&R Project No. 66W-0027-0007

Boring	Northing (Y)	Easting (X)	Latitude	Longitude
HA-19	440746	1999581	34.96103	-79.00140
HA-20	440441	1999129	34.96019	-79.00291
HA-25	440159	1996234	34.95942	-79.01257
HA-27	439731	1995552	34.95824	-79.01485
HA-29	439866	1994627	34.95861	-79.01793
HA-31	439819	1993708	34.95848	-79.02100
HA-32	439322	1993525	34.95711	-79.02161
HA-34	439274	1992582	34.95698	-79.02476
HA-36	438927	1991394	34.95603	-79.02872
HA-37A	439036	1990588	34.95633	-79.03141
HA-37B	439030	1990575	34.95631	-79.03146
HA-39	439008	1989460	34.95625	-79.03518
HA-40	439443	1989264	34.95744	-79.03583
B-19	440761	1999561	34.96107	-79.00147
B-20	440442	1999128	34.96019	-79.00291
B-25	440172	1996243	34.95945	-79.01254
B-27	439734	1995545	34.95825	-79.01487
B-29	439865	1994627	34.95861	-79.01793
B-31	439826	1993710	34.95850	-79.02099
B-32	439322	1993525	34.95711	-79.02161
B-34	439280	1992588	34.95700	-79.02474
B-36	438932	1991394	34.95604	-79.02872
B-37	439041	1990585	34.95634	-79.03142
B-39	439002	1989460	34.95623	-79.03518
B-40	439429	1989277	34.95740	-79.03579

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

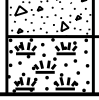
The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
$\leq$ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

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BORING LOG

Boring: HA-19 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 128 ±
Total Depth: 11.5'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/25/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		FILL: Brown, Dry, Slightly Silty Fine SAND (SP) with Trace Roots				GROUNDWATER DATA: 0 Hr: 9.0' 24 Hrs: 10.4' inside PVC Notes: 1. Surface disturbed due to hand auger location in active construction 2. Construction crews artificially lowering water levels in area during exploration
126.5	1.5	POSSIBLE FILL: Orange-Brown, Moist, Silty Fine to Medium SAND (SM)				
124.0	4.0	ALLUVIAL: Dark Brown-Black, Moist, Silty Fine to Medium SAND (SM)				
123.0	5.0	COASTAL PLAIN: Gray, Wet, Slightly Silty Fine to Medium SAND (SP-SM)				
121.0	7.0	Dark Gray-Black to Gray, Wet, Silty CLAY (CH) with Trace Organics (7.0'-8.0') and Fine Sand				
119.5	8.5	White-Gray, Saturated, Silty Fine SAND (SM-SP)				
116.5	11.5	Hand Auger Boring Terminated at 11.5 feet.				

BORING_LOG 66W-0027-0007 HAND AUGER BORE LOGS.GPJ F&R.GDT 7/15/22

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: HA-20 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 121.5 ±
Total Depth: 1.5'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/25/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
121.0	0.5	ALLUVIAL: Dark Gray, Wet, Silty Fine to Medium SAND (SM) with Trace Roots				GROUNDWATER DATA: 0 Hr: 1.0' 24 Hrs: 0.9' inside PVC Note: Hand auger terminated due to caving hole
		Gray-Black, Saturated, Silty Fine to Medium SAND (SM) with Trace Roots and Wood Fragments				
120.0	1.5	Hand Auger Boring Terminated at 1.5 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: HA-25 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 126.5 ±
Total Depth: 9.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/25/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		FILL: Tan-Brown, Dry to Moist, Silty Fine to Medium SAND (SM) with Trace Roots and Gravel				GROUNDWATER DATA: 0 Hr: 6.7' 24 Hrs: 6.0' inside PVC
		Moist at 1.0'				
124.5	2.0	Dark Gray, Moist, Fine Sandy SILT (ML) with Trace Roots and Coal				
123.5	3.0	COASTAL PLAIN: Gray, Wet, Clayey Fine to Medium SAND (SC-CL)				
120.5	6.0	Light Gray, Wet, Clayey Silty Fine to Medium SAND (SM) with Trace Mica				
118.5	8.0	Gray, Wet, Silty CLAY (CH) with Trace Mica and Fine Sand				
117.5	9.0	Hand Auger Boring Terminated at 9.0 feet.				

BORING_LOG 66W-0027-0007 HAND AUGER BORE LOGS.GPJ F&R.GDT 7/15/22

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: HA-27 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 123 ±
Total Depth: 4.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/25/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
122.5	0.5	FILL: Orange-Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Gravel				GROUNDWATER DATA: 0 Hr: 2.3' 24 Hrs: 3.5' inside PVC Note: Hand auger terminated due to caving hole
		COASTAL PLAIN: Gray-Black to Tan-Brown, Wet to Saturated, Slightly Silty Fine to Medium SAND (SM-SP) with Trace Organics (0.5'-1.0') and Coarse Sand (1.0'-2.5')				
		Saturated at 2.5'				
119.0	4.0	Hand Auger Boring Terminated at 4.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-29 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 133 ±
Total Depth: 7.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/25/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
132.8	0.2	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: 5.2' 24 Hrs: 4.7' inside PVC
		FILL: Orange-Brown, Wet, Silty Fine to Medium SAND (SM) with Trace Roots (0.0'-0.5') and Gravel				
130.5	2.5	ALLUVIAL: Dark Gray-Brown, Wet, Silty Fine to Medium SAND (SM) with Trace Roots				
128.5	4.5	Black, Saturated, Very Silty Fine to Medium SAND (SM), Slightly Organic				
128.0	5.0	Dark Gray, Saturated, Slightly Silty Fine to Coarse SAND (SM) with Trace Roots				
126.0	7.0	Hand Auger Boring Terminated at 7.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: HA-31 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 133.5 ±
Total Depth: 8.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.2	0.3	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: 7.5' 24 Hrs: 7.2' inside PVC
		POSSIBLE FILL: Brown, Wet, Silty Fine to Medium SAND (SM) with Trace Roots (0.0'-2.0')				
130.0	3.5	COASTAL PLAIN: Orange-Tan, Wet, Slightly Silty Fine SAND (SP-SM)				
129.5	4.0	Tan-Gray, Wet, Silty Clayey Fine to Medium SAND (SC)				
128.5	5.0	Tan-Gray, Wet, Clayey Silty Fine SAND (SM-SC) with Trace Coarse Sand				
126.0	7.5	Tan-Orange-Gray, Saturated, Clayey Fine to Coarse SAND (SC)				
125.5	8.0	Hand Auger Boring Terminated at 8.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-32 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 128 ±
Total Depth: 8.5'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
127.5	0.5	COASTAL PLAIN: Black, Moist, Slightly Silty Fine SAND (SM-SP) with Trace Roots				GROUNDWATER DATA: 0 Hr: 7.5' 24 Hrs: 7.4' inside PVC Note: Hand auger terminated due to caving hole
		Gray, Moist/Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Roots				
124.5	3.5	Light Gray, Wet, Silty Fine SAND (SP-SM) with Trace Mica				
123.0	5.0	Light Gray, Wet, Clayey Very Silty Fine SAND (SM) with Trace Mica				
122.0	6.0	Gray, Wet to Saturated, Silty Fine to Coarse SAND (SM) with Trace Mica				
		Saturated at 7.0'				
120.0	8.0	Orange-Gray, Wet, Silty CLAY (CL) with Trace Fine to Medium Sand				
119.5	8.5	Hand Auger Boring Terminated at 8.5 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-34 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 128.5 ±
Total Depth: 7.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		ALLUVIAL: Black, Moist/Wet, Silty Fine to Medium SAND (SM) with Trace Organics (0.0'-1.5') and Clay				GROUNDWATER DATA: 0 Hr: Dry Filled Immediately After Drilling Note: Surface disturbed due to hand auger location in active construction
126.0	2.5	COASTAL PLAIN: Dark Gray, Moist to Wet, Clayey Fine to Medium SAND (SC-CL) with Trace Mica Wet at 3.0'				
124.5	4.0	Gray-Brown, Saturated, Slightly Silty Fine to Medium SAND (SM)				
123.0	5.5	Gray, Wet, Fine to Medium Sandy CLAY (CH)				
121.5	7.0	Hand Auger Boring Terminated at 7.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-36 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 133.5 ±
Total Depth: 4.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.3	0.2	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: 2.8' 24 Hrs: 2.0' inside PVC Note: Hand auger terminated due to caving hole
		FILL: Orange-Brown, Moist, Silty Fine to Medium SAND (SM)				
132.5	1.0	COASTAL PLAIN: Dark Gray, Moist, Clayey Fine to Coarse SAND (SC)				
131.5	2.0	Tan-Gray, Wet, Clayey Silty Fine to Coarse SAND (SM-SC)				
130.5	3.0	Orange-Tan, Saturated, Slightly Clayey Silty Fine to Coarse SAND (SM)				
129.5	4.0	Hand Auger Boring Terminated at 4.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-37A (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 145.5 ±
Total Depth: 8.8'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
145.2	0.3	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: Dry Filled Immediately After Drilling Note: Hand auger offset to HA-37B 15' west to confirm refusal
		FILL: Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Gravel and Organics				
141.5	4.0	COASTAL PLAIN: Orange-Brown, Moist/Wet, Silty Fine to Medium SAND (SM)				
139.5	6.0	Red-Orange-Brown, Wet, Clayey Silty Fine to Coarse SAND (SM-SC)				
137.5	8.0	Red-Orange-Gray, Moist, Fine Sandy Clayey SILT (MH)				
136.7	8.8	Hand Auger Terminated due to Refusal at 8.8 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-37B (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 144.5 ±
Total Depth: 7.4'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		HAND AUGER PROBE				GROUNDWATER DATA: 0 Hr: Dry 24 Hrs: Dry inside PVC
137.1	7.4	Hand Auger Terminated due to Refusal at 7.4 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-39 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 132 ±
Total Depth: 11.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
131.6	0.4	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: 10.0' 24 Hrs: 10.0' inside PVC
		FILL: Dark Gray, Dry, Slightly Silty Fine SAND (SP) with Trace Roots				
131.0	1.0	Red-Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots				
130.2	1.8	COASTAL PLAIN: Tan, Moist, Slightly Silty Fine SAND (SP) with Trace Mica				
126.0	6.0	Dark Gray to Light Gray, Wet to Saturated, Silty Fine to Medium SAND (SM) with Trace Mica				
		Saturated at 10.0'				
121.0	11.0	Hand Auger Boring Terminated at 11.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: HA-40 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 134 ±
Total Depth: 7.0'
Boring Location: See Boring Location Plan

Drilling Method: Hand Auger
Hammer Type: N/A
Date Drilled: 5/26/22
Driller: C. Brake/C. Ranieri

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.9	0.1	SURFICIAL ORGANIC SOILS				GROUNDWATER DATA: 0 Hr: 6.9' 24 Hrs: 6.7' inside PVC
		FILL: Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots, Clay, and Coarse Sand				
132.0	2.0	COASTAL PLAIN: Light Gray to Tan, Moist, Slightly Silty Fine to Medium SAND (SP-SM)				
128.0	6.0	Gray, Wet, Very Silty Fine SAND (SM) with Trace Clay and Mica				
127.0	7.0	Hand Auger Boring Terminated at 7.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-19 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 127 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/18/19
Driller: M. Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Very Loose, Dark Brown, Moist, Silty Fine SAND (SM)	1-1-1	0.0		GROUNDWATER DATA:
				1.5	2	0 Hr: 3.8', Caved at 4.5'
125.0	2.0	Loose, Gray, Wet, Silty Fine SAND (SM)				24 Hrs: 3.9', Caved at 4.5'
			3-4-5	3.5		
				5.0	9	
120.0	7.0	Medium Dense, Tan, Wet, Very Silty Fine SAND (SM)				
			3-5-6	8.5		
				10.0	11	
115.0	12.0	Medium Dense, White to Brown, Wet, Silty Fine to Coarse SAND (SM)				
			8-11-14	13.5		
				15.0	25	
			3-5-7	18.5		
107.5	19.5	Medium Dense, Black, Moist, Very Silty Fine SAND (SM)		20.0	12	
105.0	22.0	Medium Dense, White, Wet, Poorly Graded SAND (SP) with Trace Silt				
			5-10-8	23.5		
102.0	25.0	Boring Terminated at 25 feet.		25.0	18	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-20 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 121.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/10/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
121.0	0.5	SURFICIAL ORGANIC SOILS	1-1-3	0.0		GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Medium Dense, Gray, Moist, Silty Fine SAND (SM)		1.5	4	0 Hr: Dry, Caved at 8.0'
			7-6-9	3.5		24 Hrs: Dry, Caved at 8.0'
				5.0	15	
114.5	7.0	Loose to Medium Dense, Gray, Saturated to Wet, Fine to Medium SAND (SP)	5-5-7	8.5		
				10.0	12	
		Wet from 13.5'-15'	4-3-4	13.5		
				15.0	7	
104.5	17.0	Very Stiff, Dark Gray, Wet, Fine Sandy CLAY (CH)	3-7-11	18.5		
101.5	20.0	Boring Terminated at 20 feet.		20.0	18	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-25 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 126.5 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		NATIVE SOILS: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	2-5-9	0.0		GROUNDWATER DATA:
124.5	2.0			1.5	14	0 Hr: 7.0', Caved at 12.5'
		Loose, Gray-Brown, Wet, Silty Clayey Fine to Medium SAND (SC) with Trace Roots	2-2-3	3.5		24 Hrs: 5.0', Caved at 7.5'
				5.0	5	
119.5	7.0	Very Loose, Gray, Wet, Wood and Silty Clayey Fine SAND (SC)	2-1-1	8.5		
				10.0	2	
114.5	12.0	Medium Dense, Light Gray, Saturated, Fine SAND (SP) with Silt and Trace Fine Gravel	11-6-6	13.5		
				15.0	12	
109.5	17.0	Loose, Dark Brown, Wet, Silty Fine to Medium SAND (SM)	11-2-5	18.5		
106.5	20.0	Boring Terminated at 20 feet.		20.0	7	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-27 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 123 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
122.8	0.2	ASPHALT	7-6-5	0.0		GROUNDWATER DATA:
122.4	0.6	FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5	11	0 Hr: 7.5' inside Temporary Observation Well
		NATIVE SOILS: Loose to Medium Dense, Light Gray, Wet, Very Silty Fine SAND (SM)	3-3-5	3.5		24 Hrs: 7.5' inside Temporary Observation Well
				5.0	8	
116.0	7.0	Medium Dense to Very Dense, Dark Gray, Wet, Silty Fine to Medium SAND (SM)				
		Noted Fine to Coarse Gravel from 8.5'-10.0'	5-6-6	8.5		
				10.0	12	
			20-30-27	13.5		
108.0	15.0	Boring Terminated at 15 feet.		15.0	57	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-29 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 133 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
132.8	0.2	ASPHALT	4-8-11	0.0	19	GROUNDWATER DATA: 0 Hr: 10.0' inside Temporary Observation Well 24 Hrs: 4.5' inside Temporary Observation Well
		FILL: Medium Dense, Brown, Moist, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5		
131.0	2.0	NATIVE SOILS: Very Loose, Gray, Wet, Silty Fine to Medium SAND (SM) with Trace Fine Gravel	WOH-WOH-1	3.5	1	
				5.0		
126.0	7.0	Dense, Light Gray, Moist, Very Silty Fine SAND (SM)	15-25-18	8.5	43	
				10.0		
121.0	12.0	Very Hard, Gray, Moist, Fine Sandy SILT (ML)	38-39-33	13.5	72	
				15.0		
116.0	17.0	Dense, Gray, Wet, Clayey Silty Fine to Coarse SAND (SM)	8-16-17	18.5	33	
113.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-31 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 134 ±
Total Depth: 25.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/9/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.3	0.7	NATIVE SOILS: Loose, Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	2-3-4	0.0		GROUNDWATER DATA:
		Loose, Brown to Gray, Moist to Wet, Silty Fine to Coarse SAND (SM) with Trace Fine Gravel		1.5	7	0 Hr: 4.5', Caved at 5.0'
			5-3-4	3.5		24 Hrs: 4.0', Caved at 4.1'
				5.0	7	
127.0	7.0	Loose, Gray, Saturated, Fine SAND (SP) with Silt				
			4-5-4	8.5		
				10.0	9	
122.0	12.0	Organically Stained Wood				
			1-1-3	13.5		
119.5	14.5	Very Loose, Dark Gray, Saturated, Very Silty Fine SAND (SM) with Trace Organics		15.0	4	
117.0	17.0	Medium Dense, Gray to Brown, Wet to Saturated, Very Silty Fine SAND (SM)				
			8-11-11	18.5		
				20.0	22	
		Saturated from 23.5'-25.0'	8-10-12	23.5		
109.0	25.0	Boring Terminated at 25 feet.		25.0	22	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-32 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 128 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/8/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
127.7	0.3	SURFICIAL ORGANIC SOILS	3-4-3	0.0	7	GROUNDWATER DATA:
		NATIVE SOILS: Very Loose to Loose, Gray to Light Gray, Moist, Very Silty Fine SAND (SM)		1.5		0 Hr: 10.0' inside Temporary Observation Well
			2-2-1	3.5	3	24 Hrs: 7.5' inside Temporary Observation Well
				5.0		
121.0	7.0	Dense, Gray, Wet, Clayey Silty Fine to Medium SAND (SM)				
			7-22-25	8.5	47	
				10.0		
116.0	12.0	Medium Dense to Dense, Light Gray, Saturated, Fine to Medium SAND (SP) with Silt				
			10-11-10	13.5	21	
				15.0		
			14-23-14	18.5	37	
108.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-34 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 129 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 6/27/19
Driller: M. Renza

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
128.9	0.1	SURFICIAL ORGANIC SOILS	1-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: 4.0', Caved at 5.0' Boring Backfilled Immediately After Drilling Completion
		NATIVE SOILS: Very Loose to Dense, Brown to Gray, Moist to Saturated, Silty Fine to Medium SAND (SM)		1.5		
		Wet from 3.5'-13.5'	6-8-10	3.5	18	
				5.0		
			4-1-1	8.5	2	
				10.0		
		Saturated from 13.5'	3-14-18	13.5	32	
				15.0		
112.0	17.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CL)	6-11-14	18.5	25	
				20.0		
107.0	22.0	Very Dense, Gray, Wet, Silty Fine to Medium SAND (SM)	11-32-47	23.5	79	
				25.0		
102.0	27.0	Hard, Dark Gray, Wet, Fine Sandy Clayey SILT (ML)	10-12-27	28.5	39	
99.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-36 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 134 ±
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
133.9	0.1	ASPHALT	6-11-10	0.0	21	GROUNDWATER DATA: 0 Hr: 10.0' inside Temporary Observation Well 24 Hrs: 1.0' inside Temporary Observation Well
		FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel		1.5		
132.0	2.0	NATIVE SOILS: Very Loose, Brown, Wet, Slightly Clayey Silty Fine to Medium SAND (SM) with Trace Fine Gravel	5-2-2	3.5	4	
				5.0		
127.0	7.0	Very Stiff to Hard, Gray, Wet, Fine Sandy Silty CLAY (CL)	12-23-26	8.5	49	
				10.0		
			11-19-27	13.5	46	
				15.0		
			7-10-16	18.5	26	
114.0	20.0	Boring Terminated at 20 feet.		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-37 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 146 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
145.8	0.2	ASPHALT	7-8-10	0.0	18	GROUNDWATER DATA:
145.5	0.5	BASE: Silty Fine SAND with Fine to Coarse Rock Fragments		1.5		0 Hr: 12.0' inside Temporary Observation Well
		FILL: Loose to Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Fine Gravel (0.5'-1.5')	5-4-4	3.5	8	24 Hrs: 10.5' inside Temporary Observation Well
				5.0		
139.0	7.0	NATIVE SOILS: Very Stiff, Dark Gray, Wet, Fine Sandy Clayey SILT (MH)	3-6-10	8.5	16	
				10.0		
			12-13-8	13.5	21	
131.5	14.5	Wood		15.0		
131.0	15.0	Medium Dense, Brown, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	3-8-14	18.5	22	
				20.0		
124.0	22.0	Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	10-21-28	23.5	49	
				25.0		
			17-20-28	28.5	48	
116.0	30.0	Boring Terminated at 30 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-39 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 132 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/4/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
131.8	0.2	ASPHALT	4-6-12	0.0	18	GROUNDWATER DATA:
		FILL: Medium Dense, Brown to Gray, Moist, Silty Fine to Medium SAND (SM)		1.5		0 Hr: Dry, Caved at 10.0'
130.0	2.0	NATIVE SOILS: Loose to Medium Dense, Gray, Moist, Very Silty Fine SAND (SM)	3-4-3	3.5	7	24 Hrs: Dry, Caved at 10.0'
				5.0		
			6-6-5	8.5	11	
				10.0		
120.0	12.0	Loose, Brown, Saturated, Silty Fine SAND (SM) with Fine to Coarse Gravel	4-5-5	13.5	10	
117.0	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-40 (1 of 1)

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC BRCO, Lake Upchurch
City/State: Fayetteville, NC

Elevation: 134.5 ±
Total Depth: 15.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 4/3/19
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
134.3	0.2	ASPHALT	9-9-7	0.2	16	GROUNDWATER DATA:
133.7	0.8	FILL: Medium Dense, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots		1.7		0 Hr: 5.5' inside Temporary Observation Well
132.5	2.0	Medium Dense, Gray, Wet, Silty Clayey Fine to Medium SAND (SC)	4-5-4	3.5	9	24 Hrs: 5.5' inside Temporary Observation Well
		NATIVE SOILS: Loose, Light Gray, Moist, Very Silty Fine SAND (SM)		5.0		
127.5	7.0	Very Stiff, Gray, Wet, Fine Sandy Clayey SILT (ML)	2-7-16	8.5	23	
				10.0		
122.5	12.0	Very Stiff, Gray, Wet, Fine Sandy CLAY (CH)	6-11-15	13.5	26	
119.5	15.0	Boring Terminated at 15 feet.		15.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

LAB RESULTS

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ASTM LABORATORY TEST SUMMARY SHEET

Project No: 66W-0027-0007

Client: WK Dickson

Project: FPWC Big Rockfish Creek Outfall, Lake Upchurch

City/State: Fayetteville, North Carolina

Sample No.	Boring/Location	Depth (ft)	Natural Moisture (%)	LL	PL	PI	USCS Class.	% GRAVEL	% SAND	% FINES	Organic Content (%)	-
S-3	B-36	8.5' - 10.0'	10.9	36	18	18	CL	N/A	N/A	71.2		
S-3	B-37	8.5' - 10.0'	29.1	68	33	35	MH	N/A	N/A	85.8		
S-3	HA-19	4.0' - 5.0'	5.8									
S-5/S-6	HA-19	7.0' - 8.5'	29.6									
S-4	HA-25	3.0' - 6.0'	11.5	32	18	14	SC-CL	0.0	51.4	48.6		
S-2/S-3	HA-27	0.5' - 2.5'	13.1									
S-5	HA-29	4.5' - 5.0'	27.3					N/A	N/A	13.6	3.9	
S-4	HA-31	4.0' - 5.0'	11.2					0.5	66.7	32.8		
S-5	HA-31	5.0' - 7.5'	10.7					1.6	81.7	16.7		
S-2/S-3	HA-32	0.5' - 3.5'	8.4									
S-8	HA-32	8.0' - 8.5'	19.7					N/A	N/A	60.8		
S-1	HA-34	0.0' - 2.5'	16.1									
S-2/S-3	HA-34	2.5' - 4.0'	15.0	34	17	17	SC-CL	0.0	51.3	48.7		
S-2	HA-36	1.0' - 2.0'	16.4									
S-3	HA-37A	4.0' - 6.0'	4.7									
S-6	HA-37A	8.0' - 8.8'	24.0					N/A	N/A	90.9		
S-2/S-3	HA-39	1.8' - 6.0'	6.7									
S-3/S-4	HA-40	2.0' - 6.0'	3.4									

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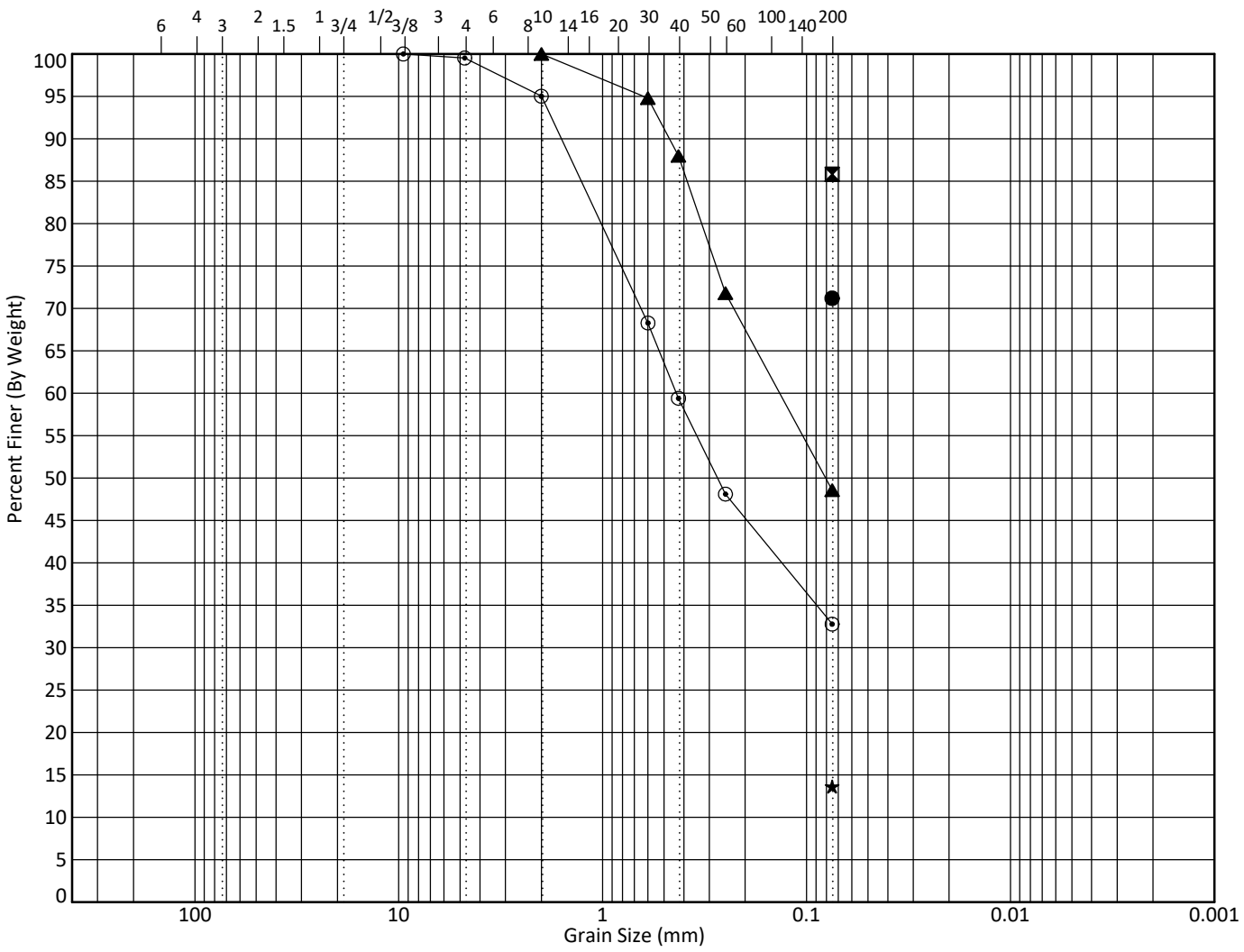
GRAIN SIZE DISTRIBUTION

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC Big Rockfish Creek Outfall, Lake Upchurch
City/State: Fayetteville, North Carolina



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth	Classification	LL	PL	PI	Cc	Cu
●	B-36	8.5' - 10.0'	LEAN CLAY with SAND (CL)	36	18	18		
⊠	B-37	8.5' - 10.0'	ELASTIC SILT (MH)	68	33	35		
▲	HA-25	3.0' - 6.0'	CLAYEY SAND (SC-CL)	32	18	14		
★	HA-29	4.5' - 5.0'	()					
⊙	HA-31	4.0' - 5.0'	()					

	Boring No.	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	% Water Content
●	B-36	8.5' - 10.0'	0.075				0.0	0.0	71.2		10.9
⊠	B-37	8.5' - 10.0'	0.075				0.0	0.0	85.8		29.1
▲	HA-25	3.0' - 6.0'	2	0.136			0.0	51.4	48.6		11.5
★	HA-29	4.5' - 5.0'	0.075				0.0	0.0	13.6		27.3
⊙	HA-31	4.0' - 5.0'	9.5	0.435			0.5	66.7	32.8		11.2

US_GRAIN_SIZE 66W-0027-0007 - LAB TESTING.GPJ F&R.GDT 6/24/22

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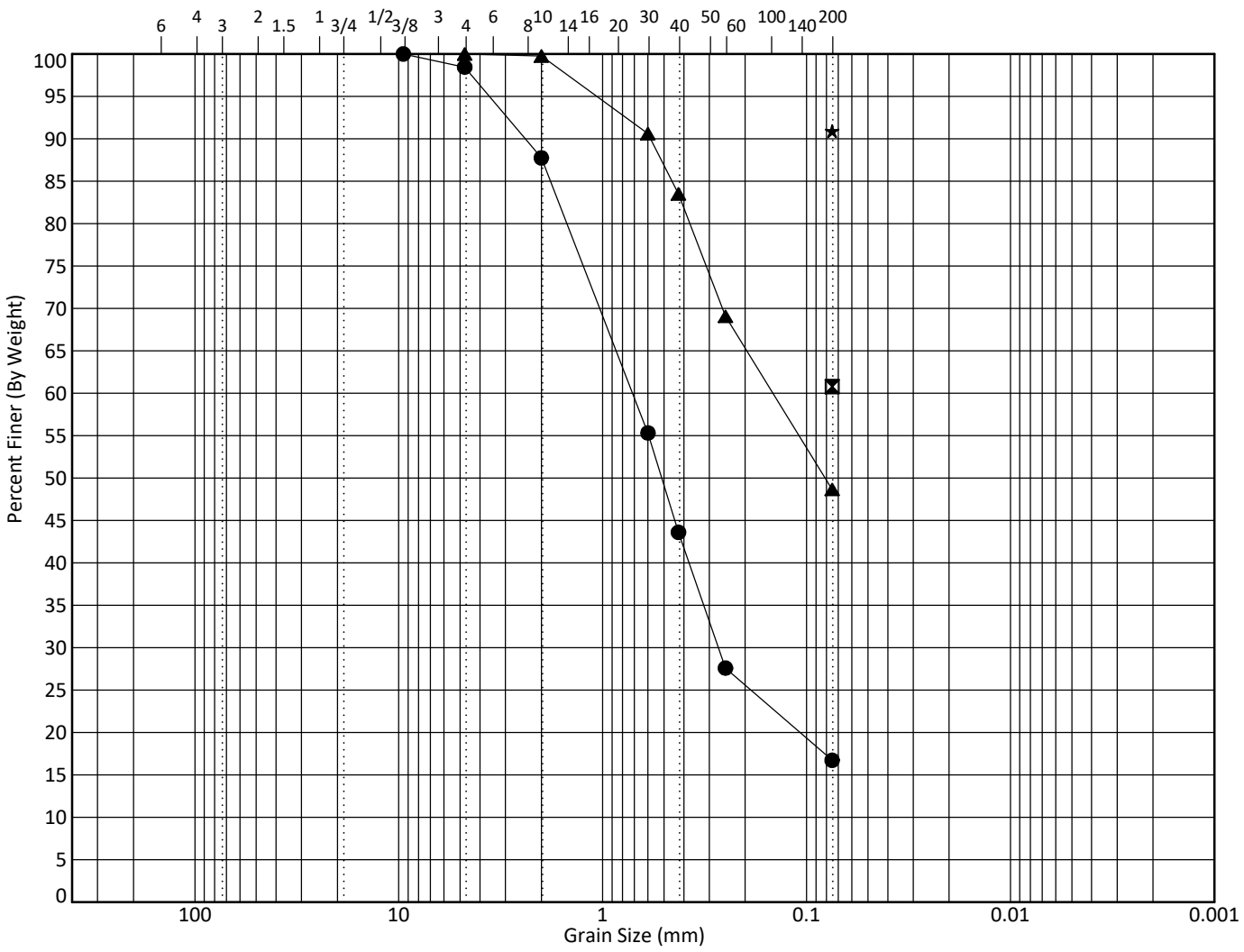
GRAIN SIZE DISTRIBUTION

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC Big Rockfish Creek Outfall, Lake Upchurch
City/State: Fayetteville, North Carolina



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth	Classification	LL	PL	PI	Cc	Cu
●	HA-31	5.0' - 7.5'	()					
⊠	HA-32	8.0' - 8.5'	()					
▲	HA-34	2.5' - 4.0'	CLAYEY SAND (SC-CL)	34	17	17		
★	HA-37A	8.0' - 8.8'	()					

	Boring No.	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	% Water Content
●	HA-31	5.0' - 7.5'	9.5	0.714	0.271		1.6	81.7	16.7		10.7
⊠	HA-32	8.0' - 8.5'	0.075				0.0	0.0	60.8		19.7
▲	HA-34	2.5' - 4.0'	4.75	0.146			0.0	51.3	48.7		15.0
★	HA-37A	8.0' - 8.8'	0.075				0.0	0.0	90.9		24.0

US_GRAIN_SIZE 66W-0027-0007 - LAB TESTING.GPJ F&R.GDT 6/24/22

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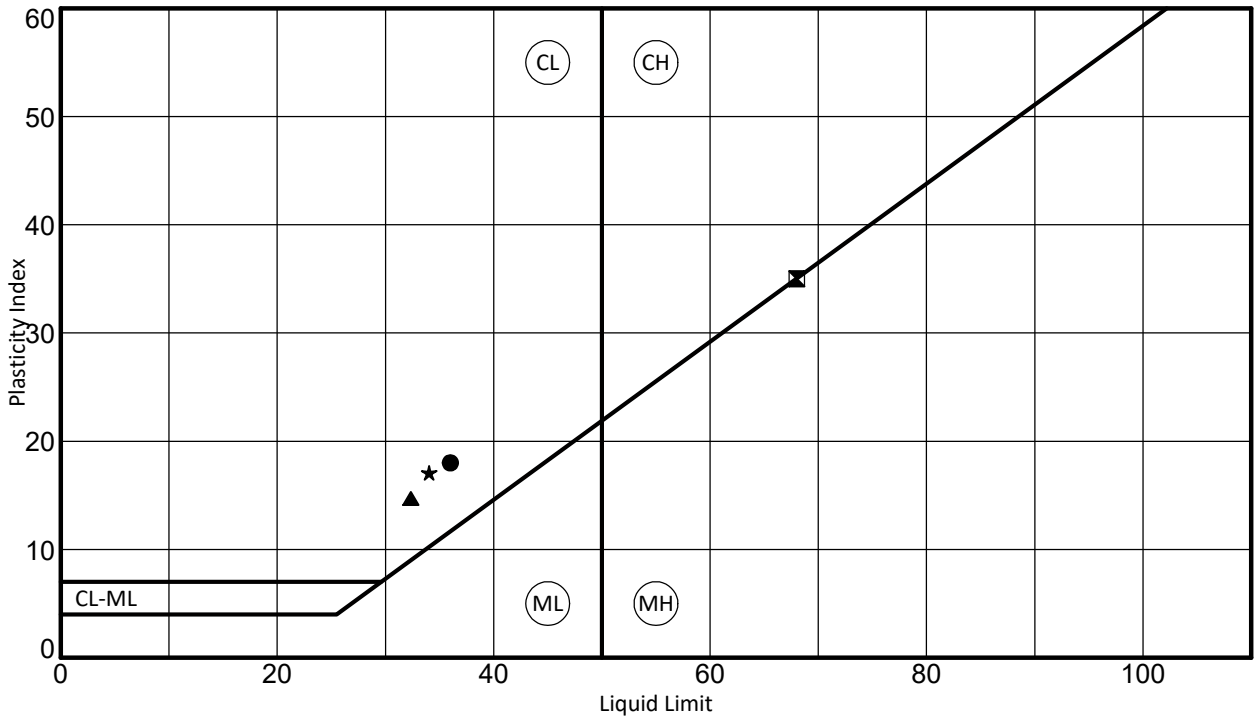
ATTERBERG LIMITS

Sheet: 1 of 1

Project No: 66W-0027-0007
Client: WK Dickson
Project: FPWC Big Rockfish Creek Outfall, Lake Upchurch
City/State: Fayetteville, North Carolina



Boring No.	Depth	LL	PL	PI	Fines	Classification	% Natural Water Content
● B-36	8.5' - 10.0'	36	18	18	71.2	LEAN CLAY with SAND (CL)	10.9
⊠ B-37	8.5' - 10.0'	68	33	35	85.8	ELASTIC SILT (MH)	29.1
▲ HA-25	3.0' - 6.0'	32	18	14	48.6	CLAYEY SAND (SC-CL)	11.5
★ HA-34	2.5' - 4.0'	34	17	17	48.7	CLAYEY SAND (SC-CL)	15.0

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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Appendix B
Permits/Encroachments

B.1
Letter of Approval of Erosion and Sedimentation Control Plan (CUMBE-2020-183)

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
BRIAN WRENN
Director

NORTH CAROLINA
Environmental Quality

June 25, 2020

LETTER OF APPROVAL

City of Fayetteville, PWC
Joseph Glass, Engineering Manager – Water Resources
955 Old Wilmington Road
Fayetteville, NC 28301

RE: Project Name: Big Rockfish Creek Outfall
Acres Approved: 2.1
Project ID: CUMBE-2020-183
County: Cumberland, City: Fayetteville
Address: Various
River Basin: Cape Fear
Stream Classification: Other
Submitted by: Wes Hutchins
Date Received by LQS: May 28, 2020
Plan Type: Utility

Dear Mr. Glass:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable and herebyissue this Letter of Approval. The enclosed Certificate of Approval must be posted at the job site. This plan shall expire three (3) years following the date of approval, if no land disturbing activity has been undertaken, as is required by Title 15A NCAC 4B .0129.

As of April 1, 2019, all new construction activities are required to complete and submit an electronic Notice of Intent (NOI) form requesting a Certificate of Coverage (COC) under the NCG010000 Construction Stormwater General Permit. This form MUST be submitted and COC issued prior to the commencement of any land disturbing activity on the above-named project. The NOI form may be accessed at deq.nc.gov/NCG01. Please direct questions about the NOI form to Annette Lucas at Annette.lucas@ncdenr.gov or Paul Clark at Paul.clark@ncdenr.gov. After you submit a complete and correct NOI Form, a COC will be emailed to you within **three business days**. Initially, DEMLR will not charge a fee for coverage under the NCG01 permit. However, on or after June 1, 2019, a $100 fee will be charged annually. This fee is to be sent to the DEMLR Stormwater Central Office staff in Raleigh.

CERTIFICATE OF PLAN APPROVAL

The posting of this certificate certifies that an erosion and sedimentation control plan has been approved for this project by the North Carolina Department of Environmental Quality in accordance with North Carolina General Statute 113A – 57 (4) and 113A – 54 (d) (4) and North Carolina Administrative Code, Title 15A, Chapter 4B.0107 (c). This certificate must be posted at the primary entrance of the job site before construction begins and until establishment of permanent groundcover as required by North Carolina Administrative Code, Title 15A, Chapter 4B.0127 (b).

Big Rockfish Creek Outfall – Cumberland County

Project Name and Location

June 25, 2020

Date of Plan Approval

Regional Engineer

Certificate of Coverage Number

Fact Sheet on the New NCG01 Permit
April 2019

The NC Construction General Permit (also known as "NCG01") was renewed on April 1, 2019. The updated permit does not significantly change the measures that are required to be implemented on construction sites. However, there are some organizational and technical updates to the permit as described below. Most notably, there is a new process in which construction sites will obtain official coverage under an NCG01 permit through an electronic process. DEMLR worked with a broad team of stakeholders to make all of these updates. If you have questions, contact Annette Lucas at Annette.lucas@ncdenr.gov or (919) 707-3639.

Organizational Updates

The new permit:

- Repeats state requirements for E&SC Plans and organizes them with federal construction activity requirements;
- Is clearly organized by topic; and
- Has less text and more tables.

Technical Updates

The new permit:

- Requires that the E&SC Plan meet SWPPP requirements (p. 2);
- Provides a list of items that must be included in the SWPPP, such as the construction sequence, plans, calculations, etc. (p. 2-4);[1]
- Has updated language on bypasses and upsets that is tailored to construction activities (p. 10);
- Puts all timeframes for inspections, record-keeping and reporting in "calendar days" for clarity and consistency (p. 11-14);[2]
- Changes the inspection frequency (during business hours) to at least once per 7 calendar days and after every storm $\geq$ 1.0 inch (previously 0.5 inch);[3] and
- Excludes weekends, state and federal holidays from normal business hours unless construction activities take place (p. 23).

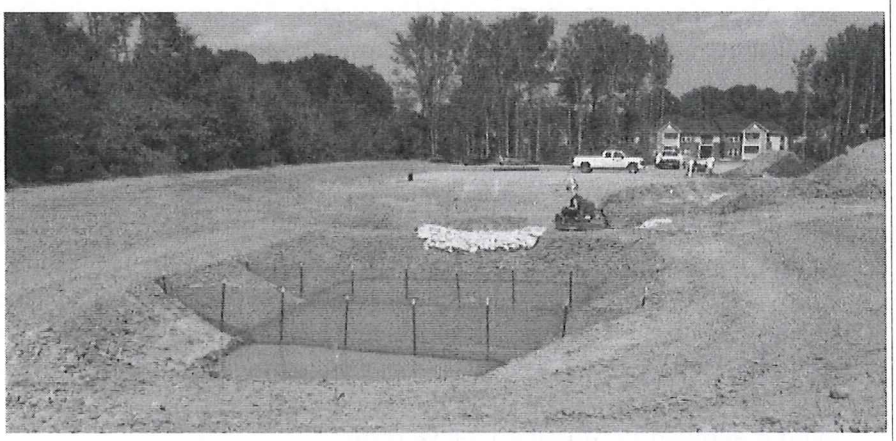
[1] This list is based on website guidance by the DEMLR Sediment Program.

[2] The number of calendar days was selected to be as equivalent as possible with the previous permit.

[3] The intent is to provide predictability to the inspection schedule.

Acronyms to Know

COC: Certificate of Coverage, proof of coverage under an NCG01 permit
DEMLR: NC Division of Energy, Mineral, and Land Resources
E&SC: Erosion & Sedimentation Control
e-NOI: Notice of Intent, application form for the NCG01 permit
e-NOT: Notice of Termination, form for closing out the NCG01 permit
SWPPP: Stormwater Pollution Prevention Plan, required by the NCG01



The NCG01 Process

The new NCG01 applies to permits approved on or after April 1, 2019.

Permittees will no longer receive a copy of the NCG01 permit in the mail with their E&SC Plan approvals and be considered as covered under the permit. Federal rules require that DEMLR receive an NOI on each construction project and issue each construction project its own COC.

Under the new NCG01 process, construction sites will continue to receive approval for E&SC Plans from either DEMLR or the delegated local E&SC program just like before. After receiving E&SC Plan approval, permittees will officially obtain coverage under the NCG01 by completing an e-NOI (available at deq.nc.gov/NCG01). The e-NOI will only take about 20 minutes to fill out and submit on-line.

Initially, there will be no charge associated with applying for an NCG01 permit but on or around June 1, 2019, DEMLR will begin charging a $100 annual general permit fee as required per §143-215.3D.

DEMLR is working on creating a single application form that will allow an applicant to simultaneously apply for an E&SC permit and an NCG01 COC. That effort is part of a larger Permit Transformation project at DEMLR.

Q&A About the New NCG01 Permit

Why do construction sites have to do this extra application step?
DEMLR is required by the EPA to issue a specific COC to every construction site that disturbs one acre or more. DEMLR is working to create a form that combines the E&SC plan approval and e-NOI processes, but that will take more time. For now, DEMLR has created an efficient e-NOI process.

If an E&SC Plan is approved before April 1, which permit applies?
Projects with already approved E&SC Plans will automatically follow the new NCG01 permit, but will not need to fill out an e-NOI or pay an annual permit fee. However, the permittees should print the new permit and the two standard detail sheets and have them on site.

Will DEMLR offer tools to help permittees comply with the new NCG01?
Yes, DEMLR will provide two sample plan sheets at deq.nc.gov/NCG01 that can be placed into the E&SC plan set. The first covers the site stabilization and materials handling portions of the permit. The second sheet covers the inspection, record-keeping and reporting portions of the permit.

How will the new e-NOI submittal and COC process work?
Permittees will apply for E&SC Plan approvals from either DEMLR or the delegated local E&SC program like before. The E&SC approval letter will instruct the permittee to visit deq.nc.gov/NCG01 to submit an e-NOI form to DEMLR. The permittee may begin the construction activity after submittal of the e-NOI. The permittee is required to print a copy of the permit and retain it on site. Initially, the COC will be issued for free but on or around June 1, 2019, a $100 annual general permit fee will be charged.

Who is allowed to submit an e-NOI form?
Submittal must be by a responsible corporate officer that owns or operates the activity, such as a president, secretary, treasurer, or vice president or a manager that is authorized in accordance with IV.B.6 of the NCG01 permit. Additional signatory options are set forth in IV.B.6 of the permit. It is possible for consultant to prepare the e-NOI, save it as a draft, and email it to the responsible entity for signature & submittal.

What happens to the COC when the construction activity is complete?
When a project is complete, the permittees will contact DEMLR or the local delegated program to close out the E&SC Plan. After DEMLR or the local E&SC program inform the permittee of the project close out via inspection report, the permittee will visit deq.nc.gov/NCG01 to submit an e-NOT.

Will there be a grace period for adherence to the new process?
DEMLR does not have the authority to grant a grace period from a federally mandated permit. Permittees will be informed of the new process via web site, E&SC Plan approval letters and list servs. If a construction activity disturbs one acre or more (or is part of common plan of development that disturbs one acre or more) fails to submit an e-NOI after approval of its E&SC Plan, this is a violation of federal permitting requirements and the permittee could be subject to a penalty assessment.

How does the new NCG01 affect the delegated local E&SC Programs?
Local programs will continue to review and approve E&SC plans. However, they will no longer send copies of the NCG01 with E&SC Plan approvals. DEMLR will provide sample language to use in local E&SC Plan approvals to advise permittees that they must submit an e-NOI to DEMLR.

Local programs are not required to check if permittees have submitted e-NOIs to DEMLR. However, if they wish to do this voluntarily, there will be a tool available on DEMLR's web site for them to view a list of construction projects that have submitted e-NOIs.

When local programs close out an E&SC Plan, the close-out letter will advise permittees that they must submit an e-NOT. DEMLR will provide sample language.

Local programs may approve E&SC plans that meet state sediment laws and rules even if those plans are not compliant with all of the NCG01 requirements. However, their permittees will be required to add two plan sheets (which will be provided by DEMLR) to their E&SC Plans to ensure that they fully comply with the ground stabilization, materials handling, and inspection, record-keeping and reporting portion of the NCG01 permit.

B.2

Letter of Approval of Erosion and Sedimentation Control Plan (CUMBE-2020-183) Permit Mod

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
BRIAN WRENN
Director

NORTH CAROLINA
Environmental Quality

October 29, 2020

LETTER OF APPROVAL

City of Fayetteville, PWC
Misty Manning, Engineering Manager
Post Office Box 1089
Fayetteville, NC 28302

RE: Project Name: Big Rockfish Creek Outfall
Acres Approved: 53.56
Project ID: CUMBE-2020-183rev
County: Cumberland, City: Fayetteville
Address: Various
River Basin: Cape Fear
Stream Classification: Other
Submitted by: Wes Hutchins
Date Received by LQS: October 20, 2020
Plan Type: Utility

Dear Mrs. Manning:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable and herebyissue this Letter of Approval. The enclosed Certificate of Approval must be posted at the job site. This plan shall expire three (3) years following the date of approval, if no land disturbing activity has been undertaken, as is required by Title 15A NCAC 4B .0129.

As of April 1, 2019, all new construction activities are required to complete and submit an electronic Notice of Intent (NOI) form requesting a Certificate of Coverage (COC) under the NCG010000 Construction Stormwater General Permit. This form MUST be submitted and COC issued prior to the commencement of any land disturbing activity on the above-named project. The NOI form may be accessed at deq.nc.gov/NCG01. Please direct questions about the NOI form to Annette Lucas at Annette.lucas@ncdenr.gov or Paul Clark at Paul.clark@ncdenr.gov. After you submit a complete and correct NOI Form, a COC will be emailed to you within **three business days**. Initially, DEMLR will not charge a fee for coverage under the NCG01 permit. However, on or after June 1, 2019, a $100 fee will be charged annually. This fee is to be sent to the DEMLR Stormwater Central Office staff in Raleigh.

Title 15A NCAC 4B .0118(a) and the NCG01 permit require that the following documentation be kept on file at the job site:

1. The approved E&SC plan as well as any approved deviation.
2. The NCG01 permit and the COC, once it is received.
3. Records of inspections made during the previous 30 days.

Also, this letter gives the notice required by G.S. 113A-61.1(a) of our right of periodic inspection to insure compliance with the approved plan.

North Carolina's Sedimentation Pollution Control Act is performance-oriented, requiring protection of existing natural resources and adjoining properties. If, following the commencement of this project, the erosion and sedimentation control plan is inadequate to meet the requirements of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statute 113A-51 through 66), this office may require revisions to the plan and implementation of the revisions to insure compliance with the Act.

Acceptance and approval of this plan is conditioned upon your compliance with Federal and State water quality laws, regulations, and rules. In addition, local city or county ordinances or rules may also apply to this land-disturbing activity. This approval does not supersede any other permit or approval.

Please note that this approval is based in part on the accuracy of the information provided in the Financial Responsibility Form, which you provided. You are requested to file an amended form if there is any change in the information included on the form. This permit allows for a land-disturbance, as called for on the application plan, not to exceed the approved acres. Exceeding the acreage will be a violation of this permit and would require a revised plan and additional application fee. Any addition in impervious surface, over that already noted on the approved plan, would also require a revised plan to verify the appropriateness of the erosion control measures and the stormwater retention measures. (GS 113A-54.1(b)). In addition, it would be helpful if you notify this office of the proposed starting date for this project. Please notify us if you plan to have a preconstruction conference.

Your cooperation is appreciated.

Sincerely,

Chris Baker

Chris Baker
Assistant Regional Engineer
DEMLR - Fayetteville Regional Office

Enclosures: Certificate of Approval

cc: Wes Hutchins, P. E., McKim & Creed, Inc. – electronic copy
Michael Baily, City of Fayetteville Permit Office – electronic copy
Fayetteville Regional Office

B.3
NCDOT Encroachment Approval U2519 BA

B.4
NCDOT Encroachment E062-20-26-00167
(Lakeview Drive)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

January 25, 2021

Mr. David W. Trego, CEO/General Manager
Public Works Commission
ATTN: Mrs. Misty Manning, PE, Water Resources Engineering Manager
Post Office Box 1089
Fayetteville, NC 28302

SUBJECT: Encroachment Agreement on SR 3399 (Lakeview Drive) in Cumberland County (E062-026-20-00167).

Dear Sir:

Attached is an approved R/W form 16.1 and plans for the installation of 150'± of 24"Φ ductile iron (DI) sanitary sewer main, 1,750'± of 24"Φ PVC (SDR-26) sanitary sewer main, thirteen (13) five (5) foot Φ sanitary sewer traffic bearing manholes with associated appurtenaces by open cut method on SR 3399 (Lakeview Drive) as associated with the Big Rockfish Creek Outfall project in Cumberland County as shown on the attached plans (PWC encroachment #18842 – AWS 15313XXX).

Location:

Route	**At a point**	**Towards**
SR 3399	190'± south of the intersection of SR 3399 (Lakeview Drive) and SR 3600 (Pineview Drive)	1,800'± to the northeast

This encroachment is approved subject to the following:

Pre-Construction

Contact Offices & Outside Agency issues/contacts/info

1. Approval may be rescinded upon failure to follow any of the provisions in this permit and may be considered a violation of the encroachment agreement.
2. The Encroaching party or their contractor shall provide the following notices prior to construction activity within the NCDOT Right of Way:
   a. Three (3) business days advance phone call Mr. Troy Baker, Senior Assistant District Engineer at telephone (910) 364-0601 or email to tlbaker@ncdot.gov to the District Engineer's office.

   Failure to provide these notifications prior to beginning construction is subject to the Division Engineer's discretion to cease construction activity for this encroachment. NCDOT reserves the right to cease any construction or maintenance work associated with this installation by the encroaching party until the construction or maintenance meets the satisfaction of the Division Engineer or their representative.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION SIX / DISTRICT TWO
POST OFFICE BOX 1150
FAYETTEVILLE, NC 28302

Telephone: (910) 364-0601
Fax: (910) 437-2529
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
600 SOUTHERN AVENUE
FAYETTEVILLE, NC 28306

3. **The encroaching party's construction contractor must submit the NCDOT Workforce Safety Plan for Encroachment Activities: COVID-19 form to the District Engineer prior to construction. Construction within nor access to the right of way shall not commence until such time as the required Workplace Safety plans has been submitted to the District office.**
4. Prior to beginning work, it is the requirement of the Encroaching Party to contact the appropriate Utility Companies involved and make arrangements to adjust or relocate any utilities that conflict with the proposed work.
5. It shall be the responsibility of the encroaching party to determine the location of utilities within the encroachment area. NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act requires underground utilities to be located by calling 811 prior to construction. The encroaching party shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruption to existing facilities and maintain access to them.
6. The encroaching party shall notify the appropriate municipal office prior to beginning any work within the municipality's limits of jurisdiction.
7. Excavation within 1000 feet of a signalized intersection will require notification by the encroaching party to the Division Traffic Engineer at telephone number (910) 364-0606 no less than one week prior to beginning work. All traffic signal or detection cables must be located prior to excavation. Cost to replace or repair NCDOT signs, signals, pavement markings or associated equipment and facilities shall be the responsibility of the encroaching party.
8. This agreement does not authorize installations within nor encroachment onto railroad rights of way. Permits for installations within railroad right of way must be obtained from the railroad and are the responsibility of the encroaching party.
9. At the option of the District Engineer, a preconstruction meeting including representatives of NCDOT, the encroaching party, contractors and municipality, if applicable, shall be required. A pre-construction conference held between a municipality (or other facility owner) and a contractor without the presence of NCDOT personnel with subsequent construction commencing may be subject to NCDOT personnel ceasing any work on NCDOT right-of-way related to this encroachment until such meeting is held. Contact the District office to schedule.
10. At the discretion of the District Engineer, a NOTIFICATION FOR UTILITY / NON-UTILITY ENCROACHMENT WITHIN NCDOT R/W form (See corresponding attachment) with the scheduled pre-construction meeting and associated construction schedule details must be completed and submitted to the District Engineer's office a minimum of one week prior to construction.
11. **A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.**

Legal & Right-of-Way Issues

12. This approval and associated plans and supporting documents shall not be interpreted to allow any design change or change in the intent of the design by the Owner, Design Engineer, or any of their representatives. Any revisions or changes to these approved plans or intent for construction must be obtained in writing from the Division Engineer's office or their representative prior to construction or during construction, if an issue arises during construction to warrant changes.
13. NCDOT does not guarantee the right of way on this road, nor will it be responsible for any claim for damages brought about by any property owner by reason of this installation. It is the responsibility of the encroaching party to verify the right of way.
14. Prior to the approval of any privately maintained facility within NCDOT right of way which the State of North Carolina is not the fee simple owner, written permission that each and every property owner affected by the installation shall be provided to NCDOT by the encroaching party. (See corresponding attachment.)
15. Encroaching party shall be responsible for obtaining all necessary permanent and/or temporary construction, drainage, utility and/or sight distance easements.
16. All Right of Way and easements necessary for construction and maintenance shall be dedicated to NCDOT with proof of dedication furnished to the District Engineer prior to beginning work.
17. No commercial advertising shall be allowed within NCDOT Right of Way.
18. The encroaching party shall obtain proper approval from all affected pole owners prior to attachment to any pole.
19. The installation within the Control of Access fence shall not adversely affect the design, construction, maintenance, stability, traffic safety or operation of the controlled access highway, and the utility must be serviced without access from the through-traffic roadways or ramps.

Bonds

20. **A Performance and Indemnity Bond in the amount of $280,000.00 shall be posted with the District Engineer's Office by the Party of the Second Part prior to beginning any work within the NCDOT Right of Way. The bond shall be held for a minimum of one year after a satisfactory final inspection of the installation by NCDOT. The bond may be held for a period longer than one year after completion if, in the opinion of NCDOT, the size or complexity of the installation warrants a longer period. The encroaching party shall be responsible for notifying the bonding company after the year and providing a copy of the encroachment agreement to the financial institution.**
21. The release of the bond is subject to a final inspection by NCDOT. Contact the District office to schedule a Final Inspection and to request release of the bond.
22. **The encroaching party shall provide a signed and sealed letter from a Professional Engineer certifying that the materials and construction associated with the encroachment agreement were in compliance with the approved plans, agreement, and the current NCDOT Standard Specifications and Standard Drawings. All testing results (asphalt, concrete, compaction, etc.), records (inspector daily diary reports, materials received reports, etc.) associated with the improvements required by this encroachment agreement shall be submitted to the District Engineer upon completion of the project.**

Work Zone Traffic

23. Traffic control shall be coordinated with the District Engineer and the Division Traffic Engineer, Mr. Frank West at telephone (910) 364-0606, prior to construction.

24. WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

    All personnel performing any activity inside the highway right of way are required to be familiar with the NCDOT Maintenance / Utility Traffic Control Guidelines (MUTCG). No specific training course or test is required for qualification in the Maintenance /Utility Traffic Control Guidelines (MUTCG).

    All flagging, spotting, or operating Automated Flagger Assist Devices (AFAD) inside the highway right of way requires qualified and trained Work Zone Flaggers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel involved with the installation of Work Zone Traffic Control devices inside the highway right of way are required to be qualified and trained Work Zone Installers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel in charge of overseeing work zone Temporary Traffic Control operations and installations inside the highway right of way are required to be qualified and trained Work Zone Supervisors. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    For questions and/or additional information regarding this training program please refer to https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx or call the NCDOT Work Zone Traffic Control Section (919) 814-5000.

25. The party of the second part shall employ traffic control measures that are in accordance with the prevailing federal, state, local, and NCDOT policies, standards, and procedures. These policies, standards, and procedures include, but are not limited to the following:
    a. Manual on Uniform Traffic Control Devices (MUTCD) – North Carolina has adopted the MUTCD to provide basic principles and guidelines for traffic control device design, application, installation, and maintenance. North Carolina uses the MUTCD as a minimum requirement where higher supplemental standards specific to North Carolina are not established. Use fundamental principles and best practices of MUTCD (Part 6, Temporary Traffic Control).
    b. NCDOT Maintenance / Utility Traffic Control Guidelines – This document enhances the fundamental principles and best practices established in MUTCD Part 6, Temporary Traffic Control, incorporating NCDOT-specific standards and details. It also covers important safety knowledge for a wide range of work zone job responsibilities.

26. If the Traffic Control Supervisor determines that portable concrete barrier (PCB) is required to shield a hazard within the clear zone, then PCB shall be designed and sealed by a licensed North Carolina Professional Engineer. PCB plans and design calculations shall be submitted to the District Engineer for review and approval prior to installation.

27. Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to police, EMS and fire stations, fire hydrants, secondary schools, and hospitals.

28. OUTSIDE OF DISTURBED AREA (SR 3399): Traffic shall be maintained at all times. All lanes of traffic are to be open during the hours of 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Monday through Friday, during any time of inclement weather, **or as directed by the District Engineer**. No lane of traffic shall be closed on holidays, special events, or as directed by the engineer. Any violation of these hours will result in ceasing any further construction by the Encroaching Party or their contractor.
29. Nighttime and weekend operations will NOT be allowed unless written approval is received from the District Engineer. If nighttime or weekend work is allowed or required, all signs must be retro-reflective, and a work zone lighting plan must be submitted for approval prior to construction.
30. Two-way traffic shall be maintained at all times unless designated by the District Engineer. Traffic shall not be rerouted or detoured without the prior written approval from the District Engineer. No utility work will be allowed on state holidays from 7:00 PM the night before through 9:00 AM the day prior to, following or during local events without prior approval from the District Engineer. If the construction is within 1000 feet of a school location or on a designated bus route, the construction shall be coordinated with the school start and end times to avoid traffic delays.
31. Work requiring lane or shoulder closures shall not be performed on both sides of the road simultaneously within the same area.
32. Any work requiring equipment or personnel within 5 feet of the edge of any travel lane of an undivided facility and within 10 feet of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers per current *NCDOT Roadway Standard Drawings or MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES*.
33. At the discretion of the District Engineer, a traffic control plan shall be developed and submitted under the seal and signature of a Licensed North Carolina Professional Engineer prior to construction. The plan shall be specific to the site and adequately detailed. Issues such as the close proximity to intersections shall be addressed.
34. Temporary and final pavement markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted with the encroachment request to the Division Traffic Engineer prior to construction. Final pavement markings shall be thermoplastic unless otherwise directed by the Division Traffic Engineer or District Engineer.
35. Any pavement markings that are damaged or obliterated shall be restored by the encroaching party at no expense to NCDOT.
36. Sidewalk closures shall be installed as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with The American with Disabilities Act Accessibility Guidelines. The encroaching party must adhere to the guidelines for accommodating pedestrians in encroachment work zones as described in the NCDOT Pedestrian Work Zone Accommodations Training found at https://www.youtube.com/watch?v=AOuYa5IW3dg&feature=youtu.be

Roadside Environmental

37. The encroaching party shall comply with all applicable Federal, State and local environmental regulations and shall obtain all necessary Federal, State and local environmental permits, including but not limited to, those related to sediment control, stormwater, wetland, streams, endangered species and historical sites. Additional information can be obtained by contacting the NCDOT Roadside Environmental Engineer regarding the North Carolina Natural Heritage Program or the United States Fish and Wildlife Services. Contact the Division Roadside Environmental Engineer's Office at (910) 364-0603.

38. When surface area in excess of one acre will be disturbed, the Encroacher shall submit a Sediment and Erosion Control Plan which has been approved by the appropriate regulatory agency or authority prior to beginning any work on the Right of Way. Failure to provide this information shall be grounds for suspension of operations. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with the approved sediment and erosion control plan.

39. The Verification of Compliance with Environmental Regulations (VCER-1) form is required for all non-utility encroachment agreements or any utility encroachments when land disturbance within NCDOT right of way exceeds 1 acre. The VCER-1 form must be PE sealed by a NC registered professional engineer who has verified that all appropriate environmental permits (if applicable) have been obtained and all applicable environmental regulations have been followed.

40. All erosion control devices and measures shall be constructed, installed, maintained, and removed by the Encroacher in accordance with all applicable Federal, State, and Local laws, regulations, ordinances, and policies. Permanent vegetation shall be established on all disturbed areas in accordance with the recommendations of the Division Roadside Environmental Engineer. All areas disturbed (shoulders, ditches, removed accesses, etc.) shall be graded and seeded in accordance with the latest *NCDOT Standards Specifications for Roads and Structures* and within 15 calendar days with an approved NCDOT seed mixture (all lawn type areas shall be maintained and reseeded as such). Seeding rates per acre shall be applied according to the Division Roadside Environmental Engineer. Any plant or vegetation in the NCDOT planted sites that is destroyed or damaged as a result of this encroachment shall be replaced with plants of like kind or similar shape.

41. **No trees within NCDOT shall be cut without authorization from the Division Roadside Environmental Engineer. An inventory of trees measuring greater than 4 caliper inches (measured 6" above the ground) is required when trees within C/A right of way will be impacted by the encroachment installation. Mitigation is required and will be determined by the Division Roadside Environmental Engineer's Office.**

42. Prior to installation, the Encroaching Party shall contact the District Engineer to discuss any environmental issues associated with the installation to address concerns related to the root system of trees impacted by boring or non-utility construction of sidewalk, roadway widening, etc.

43. The applicant is responsible for identifying project impacts to waters of the United States (wetlands, intermittent streams, perennial streams and ponds) located within the NCDOT right-of-way. The discharge of dredged or fill material into waters of the United States requires authorization from the United States Army Corps of Engineers (USACE) and certification from the North Carolina Division of Water Quality (NCDWQ). The applicant is required to obtain pertinent permits or certification from these regulatory agencies if construction of the project impacts waters of the United States within the NCDOT right-of-way. The applicant is responsible for complying with any river or stream Riparian Buffer Rule as regulated by the NCDWQ. The Rule regulates activity within a 50-foot buffer along perennial streams, intermittent streams and ponds. Additional information can be obtained by contacting the NCDWQ or the USACE.
44. The contractor shall not begin the construction until after the traffic control and erosion control devices have been installed to the satisfaction of the Division Engineer or their agent.
45. The contractor shall perform all monitoring and record keeping and any required maintenance of erosion and sediment control measures to maintain compliance with stormwater regulations.

~~STIP (or Division Managed) Projects~~

~~46. State Transportation Improvement Project (STIP) X-XXXX is scheduled for future construction. Any encroachment determined to be in conflict with the construction of this NCDOT project shall be removed and/or relocated at the encroaching party's expense~~

Construction

General

47. An executed copy of the encroachment agreement, provisions and approved plans shall be present at the construction site at all times. If safety or traffic conditions warrant such an action, NCDOT reserves the right to further limit, restrict or suspend operations within the right of way.
48. The Encroaching Party and/or their Contractor shall comply with all OSHA requirements. If OSHA visits the work area associated with this encroachment, the District Office shall be notified by the encroaching party immediately if any violations are cited.
49. Any REVISIONS marked in RED on the attached non-PE sealed plans shall be incorporated into and made part of the approved encroachment agreement.
50. All disturbed areas are to be fully restored to current NCDOT minimum roadway standards or as directed by the Division Engineer or their representative. Disturbed areas within NCDOT Right-of-Way include, but not limited to, any excavation areas, pavement removal, drainage or other features.
51. The encroaching party shall notify the Division Engineer or their representative immediately in the event any drainage structure is blocked, disturbed or damaged. All drainage structures disturbed, damaged or blocked shall be restored to its original condition as directed by the Division Engineer or their representative.
52. A minimum of 5 feet clearance is required for utility installations beneath or near drainage pipes, headwalls, and a minimum of two-foot clearance below the flowline of streams. If directional drilling, a minimum ten-foot clearance distance is required from drainage structures and a minimum of 5 feet below flowline of streams.

53. At points where the utility is placed under existing storm drainage, the trench will be backfilled with excavatable flowable fill up to the outside diameter of the existing pipe.
54. Unless specified otherwise, during non-working hours, equipment shall be located away from the job site or parked as close to the right of way line as possible and be properly barricaded in order not to have any equipment obstruction within the Clear Recovery Area. Also, during non-working hours, no parking or material storage shall be allowed along the shoulders of any state-maintained roadway.
55. No access to the job site, parking or material storage shall be allowed along or from the **Control of Access Roadway.**
56. Guardrail removed or damaged during construction shall be replaced or repaired to its original condition, meeting current NCDOT standards or as directed by the Division Engineer or their representative.
57. The resetting of the Control of Access fence shall be in accordance with the applicable NCDOT standard and as directed by the Division Engineer or their representative.
58. Right of Way monuments disturbed during construction shall be referenced by a registered Land Surveyor and reset after construction.
59. All traffic signs moved during construction shall be reinstalled as soon as possible to the satisfaction of the Division Engineer or their representative.
60. Any utility markers, cabinets, pedestals, meter bases and services for meter reading required shall be as close to the Right of Way line as possible. If it is not feasible to install at or near Right of Way line, then written approval shall be obtained from NCDOT prior to installation.
61. Detection tape, where required by NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act, shall be buried in the trench approximately 1 foot above the installed facility. Where conduit is installed in the right of way and is not of ferrous material, locating tape or detection wire shall be installed with the conduit.
62. All driveways disturbed during construction shall be returned to a state comparable with the condition of the driveways prior to construction.
63. Any proposed driveway connections onto NCDOT roadways will require an approved driveway permit. The approval of this encroachment agreement does not constitute approval of any proposed driveway connections. For further information, contact Mr. Troy L. Baker, Senior Assistant District Engineer at (910) 364-0601.
64. Conformance with driveway permit review should be required in conjunction with this encroachment agreement. In the event there is a conflict between the driveway permit and the encroachment agreement, the District Engineer should resolve the conflict and notify the parties involved.
65. **If the approved method of construction is unsuccessful and other means are required, prior approval must be obtained through the District Engineer before construction may continue.**

Engineering

66. All traffic control, asphalt mixes, structures, construction, workmanship and construction methods, and materials shall be in compliance with the most-recent versions of the following resources: *ASTM Standards*, *Manual on Uniform Traffic Control Devices, NCDOT Utilities Accommodations Manual, NCDOT Standard Specifications for Roads and Structures, NCDOT Roadway Standard Drawings,* NCDOT *Asphalt Quality Management System* manual, **and the approved plans.**
67. Prior approval for any blasting must be obtained from the Division Engineer or their representative.
68. Regulator stations, metering stations, cathodic test stations, and anode beds are not permitted within NCDOT right of way. Header wires are permitted.
69. Non-Utility Communication and Data Transmission installations (ground mounted type or Small Cell pole-mounted type) must adhere to guidelines in the Utilities Accommodations Manual and, when located within municipal jurisdictions, are subject to review and approval by municipal ordinances and any additional municipal approval for proximity to historic districts and landmarks. All wiring and related telecommunications work shall conform to the latest regulations by the Federal Communications Commission.
70. All wiring and related electrical work shall conform to the latest edition of the National Electrical Safety Code.

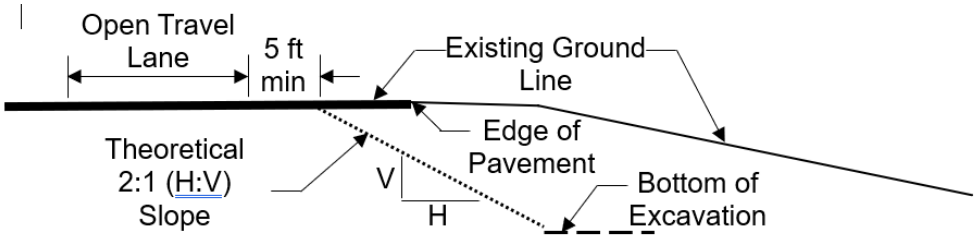
Location within R/W

71. All utility access points, such as manholes, vaults, handholes, splice boxes and junction boxes shall be located as close to the right of way line as possible and shall not be placed in the ditch line, side slopes of the ditches or in the pavement. All manholes, handholes, splice boxes, junction boxes and vaults and covers shall be flush with the ground when located within the vehicle clear zone. Slack loops for telecommunications in industry standard housing units shall be buried a minimum of 18 inches when buried or meet minimum NCDOT vertical and horizontal clearances when installed aerially.
72. Fire Hydrants shall be of the breakaway type. Hydrants shall be placed near the right of way line. In curb and gutter sections with written approval from the District, the hydrants may be placed at 6' behind the back of the curb or minimum 2’ back of sidewalk.
73. Luminaire and/or utility poles and guy wires shall be set as close to the Right of Way line as practical and outside the Clear Zone in accordance with the latest version of the AASHTO Roadside Design Guide (See corresponding attachment) or made breakaway in accordance with the requirements of NCHRP Report 350. Any relocation of the utility poles from the original design due to Clear Zone requirements shall require a re-submittal for the utility design.
74. Luminaire and/or utility poles shall be set a minimum of 5’-6” behind face of any guardrail or otherwise sufficiently protected. However, standard placement may be reduced to 3’-6” behind face of guardrail when posts are spaced 3’-1 ½”, or where speed limit is less than 55 MPH.

75. Hot box (aka ASSE 1060) or Safe-T-Cover type enclosures covering utility main pipe joints, backflow preventers, valves, vent pipes, cross connections, pumps, grinders, irrigation assemblies, transformers, generators, and other similar large appurtenances shall be located outside sight distance triangles and off of the NCDOT Right-of-Way.
76. Sprinkler heads shall be located a minimum of 10 feet from the edge of pavement, edge of shoulder, or back of curb whichever is greater and shall be directed so that water does not spray or drain on the roadway surface, sidewalk, or passing vehicles at any time. Upon completion of the installation and prior to activation of the system, the Encroacher shall contact the District Engineer to schedule a test of the system to verify the spray pattern. Sprinkler systems shall not be operated during periods of high wind or freezing weather, or to the extent that the subgrade adjacent to the pavement structure becomes saturated. NCDOT reserves the right to require immediate termination and removal of any sprinkler system which in its judgement and opinion adversely affects safety, maintenance, or operation of the roadway.

Excavation

77. Excavation material shall not be placed on pavement.
78. It is the responsibility of the encroaching party or their contractor to prevent any mud/dirt from tracking onto the roadway. Any dirt which may collect on the roadway pavement from equipment and/or truck traffic on site shall be immediately removed to avoid any unsafe traffic conditions.
79. Excavated areas adjacent to pavement having more than a 2" drop shall be safed up at a 6:1 or flatter slope and designated by appropriate delineation during periods of inactivity, including, but not limited to, night and weekend hours. Excavated material shall not be placed on the roadway at any time.
80. ~~The utility shall be installed within 5 feet of the right of way line and outside the 5 foot minimum from travel lane plus theoretical 2:1 slope from the edge of pavement to the bottom of the nearest excavation wall for temporary shoring. If the 2:1 slope plus 5 feet requirement above is met for traffic, then temporary shoring is typically only necessary to protect roadways from damage when a theoretical 1:1 slope from the edge of pavement intersects the nearest excavation wall.~~ This rule of thumb should be used with caution and does not apply to all subsurface conditions, surcharge loadings and excavation geometries. Situations where this 1:1 slope is not recommended include groundwater depth is above bottom of excavation or excavation is deeper than 10 feet or in Type B or C soils as defined by OSHA Technical Manual. Temporary shoring may be avoided by locating trenches, bore pits, and other excavations far enough away from the open travel lane, edge of pavement and any existing structure, support, utility, property, etc. to be protected. Temporary shoring is required when a theoretical 2:1 slope from the bottom of excavation will intersect the existing ground line less than 5 feet from the outside edge of an open travel lane as shown in the figure below or when a theoretical 2:1 slope from the bottom of excavation will intersect any existing structure, support, utility, property, etc. to be protected.



Temporary shoring shall be designed and constructed in accordance with current NCDOT Standard Temporary Shoring provisions (refer to https://connect.ncdot.gov/resources/Specifications/Pages/2018-Specifications-and-Special-Provisions.aspx and see SP11 R002).

a. Temporary excavation shoring, such as sheet piling, shall be installed. The design of the shoring shall include the effects of traffic loads. The shoring system shall be designed and sealed by a licensed North Carolina Professional Engineer. Shoring plans and design calculations shall be submitted to the Division Engineer for review and approval prior to construction. (See NCDOT *Utilities Accommodations Manual* for more information on requirements for shoring plans and design calculations.) **Trench boxes shall not be accepted as temporary shoring and will not be approved for use in instances where shoring is required to protect the highway, drainage structure, and/or supporting pavement or structure foundation**.

b. All trench excavation inside the limits of the theoretical one-to-one slope, as defined by the policy, shall be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight. Any excavation that is not backfilled by the end of the workday must address any safety and traveling public concerns including accommodations for bicycles, pedestrians and persons with disabilities.

c. The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled in accordance with Section 300-7 of the latest *NCDOT Standard Specifications for Roads and Structures*, which basically requires the backfill material to be placed in layers not to exceed 6 inches loose and compacted to at least 95% of the density obtained by compacting a sample in accordance with AASHTO T99 as modified by DOT.

d. A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.

e. The length of parallel excavation shall be limited to the length necessary to install and backfill one joint of pipe at a time, not to exceed twenty-five (25) feet.

81. All material to a depth of 8 inches below the finished surface of the subgrade shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade. The option to backfill any trenches with dirt or either #57 stone or #78 stone with consolidation with a plate tamp and without a conventional density test may be pursued with the written consent of the District Engineer. If this option is exercised, then roadway ABC stone and asphalt repair as required will also be specified by the District Engineer.

Directional bore

82. Boring equipment will be provided of a type and size to facilitate boring in the local geologic conditions and shall be able to facilitate the encroachment work.

83. When Horizontal Directional Drilling (HDD) is used, the following stipulations apply:
    a. Use drilling fluids as appropriate for the type soils but use of water alone is prohibited. Pump drilling fluids only while drilling or reaming. Directional boring using jetting with a Bentonite (or equivalent material) slurry is recommended. Monitor flow rates to match the amount leaving the bore hole and do not increase pressure or flow to free stuck drill heads, reamers or piping. Open cutting to retrieve stuck drill heads is not allowed without prior permission from the District Engineer.
    b. The minimum depth shall adhere to the table below for transverse (under non-controlled access, partial controlled access, or limited controlled access roadway) installations and refers to maximum diameter of hole drilled and not the dimension of the carrier or encasement pipe.

Diameter of Drilled Hole (Backream)	Minimum Depth of Cover
2" to 6”	5 feet
>6” to 15”	12 times hole diameter (e.g. 6-inch hole means 6 feet minimum depth)
>15” to 36”	15 feet or greater

    c. Under fully controlled access roadway installations, the minimum depth for transverse crossings shall be 15 feet under any pavement (ramps or thru lanes)
    d. An overbore (backream diameter) shall not be more than 1.5 times the outside diameter of the pipe or encasement under any highway for pipes 12 inches in diameter or less. For pipes with outer diameter larger than 12 inches, the overbore may be no larger than outer diameter of pipe plus 6 inches. An overbore exceeding 1.5 times greater than the outside diameter of the pipe or encasement may be considered if the encroachment agreement includes a statement signed and sealed by a licensed North Carolina Professional Engineer indicating that an overbore in excess of 1.5 times the outside diameter of the pipe or encasement will appropriately arch and no damage will be done to the pavement or sub-grade.
    e. Directional boring is allowed beneath embankment material in naturally occurring soil.

f. Any parallel installation utilizing the directional boring method shall be made at a minimum depth of three (3') feet (cover) below the ground surface and outside the theoretical 1:1 slope from the existing edge of pavement except where the parallel installation crosses a paved roadway.
g. All directional bores shall maintain ten (10) feet minimum (clear) distance from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts or box culverts. Directional bores are not allowed beneath bridge footings, culvert wingwall footings, slope protection or retaining walls.
h. The tip of the drill string shall have a cutter head.
i. Detection wire shall be installed with non-ferrous material.
j. HDPE pipe installed by directional boring shall not be connected to existing pipe or fittings for one (1) week from the time of installation to allow tensional stresses to relax.

Aerial clearances

84. Vertical clearance of overhead power and communication lines shall meet the National Electrical Safety Code requirements except the minimum vertical clearance shall be 18' for crossings over NCDOT roadways (24' over Fully Controlled Access roadways) and 16' for parallel installations.

85. In relation to the bridge, the utility line shall be located with minimum clearances as indicated on the attachment for NCDOT **Required Clearances for Aerial Installations by Encroachment Near Bridge Structures**.

Pavement Detail and Repair

86. The paving of this roadway shall be in accordance with the latest version of the NCDOT Standard Specifications, Sections 610, 1012 and 1020. The Contractor shall follow all procedures of the Quality Management System (QMS) for asphalt pavement - Maintenance Version (see https://connect.ncdot.gov/resources/Materials/MaterialsResources/2018%20QMS%20Asphalt%20Manual.pdf). The Contractor must adhere to all testing requirements and quality control requirements specified. The Contractor shall contact the NCDOT Division QA Supervisor prior to producing plant mix and make the Supervisor aware that the mix is being produced for a future NCDOT road. Contact the District Engineer to determine the NCDOT Division QA Supervisor. Only NCDOT approved mix designs will be acceptable. A Quality Control Plan shall be submitted (as Directed by the District Engineer) to the District Engineer's Office prior to asphalt production utilizing form QMS-MV1. Failing mixes and/or densities are subject to penalties including monetary payments or removal and replacement. To minimize traffic queuing in construction areas, the possibility of traffic detours may be considered when working on high traffic routes even if traffic control is used. The District Engineer may require traffic detours.

87. A roadway certification report sealed by a Professional Engineer shall be submitted to the District Engineer's office indicating the following:

- **Pavement thickness by type**
- **Pavement density, core and/or test locations**
- **Base thickness**
- **Base density**
- **Subgrade density**

Test frequency and method shall be in conformance with the NCDOT *Materials and Tests Manual*. Test must be performed by a Certified Technician including name and Certification number on report.

88. "Potholing" pavement cores to expose existing utilities shall be made with an 18" diameter keyhole pavement core. Pavement core locations shall not be placed in the wheel path whenever possible. Vacuum excavation shall be utilized to expose underground utilities. Pavement cores shall be repaired within the same working day. The pavement core shall be retained and reused to fill the core hole.

    The excavation shall be backfilled and compacted with select material to the bottom of the existing pavement structure or as indicated by the District Engineer. The retained core shall be placed in the hole and secured with a waterproof, mechanical joint. If the pavement core is damaged and cannot be re-used, the core may be replaced with the surface mix, S9.5B. The asphalt patch shall match the thickness of the existing asphalt or four inches, whichever is greater. All materials must be listed on the NCDOT Approved Products List (APL) found at: https://apps.ncdot.gov/vendor/approvedproducts/.

~~89. All open cuts (if permitted) on primary routes will require full depth patching with 5.0" of B 25.0 B (ACBC) Asphalt Concrete Base Course, 3.0" of I 19.0 B (ACIC) Asphalt Concrete Intermediate Course and 2.0" of S 9.5 B (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 2.0" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.~~

90. All open cuts on secondary routes will require full depth patching with 4.0" of B 25.0 C (ACBC) Asphalt Concrete Base Course and 1.5" of S 9.5 C (ACSC) Asphalt Concrete Surface Course. It will also be required to mill the existing pavement surface at a depth of 1.5" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail. The entire roadway surface shall be overlaid with 1.5" of S 9.5 C (ACSC) Asphalt Concrete Surface Course.

91. Eight inches of ABC will be used as the base. Compaction test shall be performed at the location of every open cut that crosses NCDOT roadways. The owner will be required to have an approved laboratory furnish the District Office a copy of the test results.

92. The encroaching party will be required to mill at a depth of 0" – 1.5" for a distance of twenty-five feet (25') at the beginning and twenty-five feet (25') at the end of the project (each side of the required overlay) to allow for a smooth transition with the existing pavement as shown on the attached plans.

93. Pavement cuts shall be repaired the same day the cuts are made unless an asphalt patch cannot be accomplished the same day due to material availability or time restrictions. When the asphalt patch is not feasible, the following apply:
    a. The pavement cut shall be filled to the surface with ABC stone or Flowable Fill per NCDOT's Standards and Specifications.
    b. Once the cut is filled, a minimum ¾-inch steel plate shall be placed and pinned to prevent moving. Plates shall be designed large enough to span a minimum of 1-foot on all sides on the pavement cut.
    c. When flowable fill is used, it shall cure for 24 hours prior to any asphalt material placement. Flowable fill bleed water shall not be present during paving operations. Paving shall not cause damage (shoving, distortion, pumping, etc.) to the flowable fill.
    d. Install and leave "BUMP" signs according to MUTCD until the steel plate has been removed. Once the flowable fill has cured, remove the steel plate, and mill/fill according to the directions of the District Engineer.
    e. All pavement cuts must be sealed with NCDOT approved sealant to prevent future pavement separation or cracking.

94. **Any pavement damaged because of settlement of the pavement or damaged by equipment used to perform encroachment work, shall be re-surfaced to the satisfaction of the District Engineer. This may include the removal of pavement and a 50' mechanical overlay. All pavement work and pavement markings (temporary and final) are the responsibility of the Encroaching Party.**

95. All concrete installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

96. All concrete sidewalk installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01 and 848.01) and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

97. All ADA compliant curb ramps shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 848.06) and Amendments or Supplementals thereto including but not limited to the Alternate Curb Ramp Designs (Curb Ramp Details - Parallel Ramps). All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

98. All 30" curb and gutter within NCDOT rights of way shall be constructed with Class B concrete in accordance with Section 846 of the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01) and Amendment or Supplemental thereto or as directed by the engineer. All concrete testing results shall be provided to the District Engineer's office at time of project completion.

Post Construction

Close out/ Inspection

99. The Encroaching party shall notify the District Engineer's office within 2 business days after construction is complete. The District Engineer may perform a construction inspection. Any deficiencies may be noted and reported to the encroaching party to make immediate repairs or resolve any issues to restore the right-of-way to a similar condition prior to construction, including pavement, signage, traffic signals, pavement markings, drainage, structures/pipes, or other highway design features.

100. At the discretion of the District Engineer, a final inspection report may be provided to the encroaching party upon satisfactory completion of the work.

101. A written acknowledgement of the completed work by the District Engineer's office begins the one-year warranty period associated with the performance bond.

102. Within ninety (90) days of the completion of the proposed utility installation, an As-Built drawing(s) and an executed Certification Memo shall be submitted to the District Office (online encroachment database). The As-Built drawing(s) shall depict the horizontal and vertical locations of all utilities and associated appurtenances.

103. A copy (in PDF format) of the completed ground water analysis shall be given to the District Engineer, including detailed drawings of the "as-built" wells showing location, depth and water level in well.

If further information or assistance is needed in reference to this project, please feel free to call Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer at (910) 364-0601.

Sincerely,

DocuSigned by:
Greg W. Burns
C2649BD929294B9...

DS
TLB

Greg W. Burns, PE
Division Engineer

GWB:tlb

cc: https://connect.ncdot.gov/site/Permits/Pages/All-Submissions.aspx

B.5
NCDOT Encroachment E062-026-20-00168
(Lake Farm Road)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

March 15, 2021

Mr. David W. Trego, CEO/General Manager
Public Works Commission
ATTN: Mrs. Misty Manning, PE, Water Resources Engineering Manager
Post Office Box 1089
Fayetteville, NC 28302

SUBJECT: Encroachment Agreement on SR 3473 (Lake Farm Drive) in Cumberland County (E062-026-20-00168).

Dear Sir:

Attached is an approved R/W form 16.1 and plans for the installation of 570'± of 24" Φ PVC (SDR-26) sanitary sewer main, four (4) five (5) foot Φ sanitary sewer traffic bearing manholes with associated appurtenances by open cut method on SR 3473 (Lake Farm Drive) as associated with the Big Rockfish Creek Outfall project in Cumberland County as shown on the attached plans (PWC encroachment #18843 – AWS 15313YYY).

Location:

Route	At a point	Towards
SR 3473	190'± south of the intersection of SR 3473 (Lake Farm Drive) and SR 3438 (Lake Farm Drive)	570'± to the southwest

This encroachment is approved subject to the following:

Pre-Construction

Contact Offices & Outside Agency issues/contacts/info

1. Approval may be rescinded upon failure to follow any of the provisions in this permit and may be considered a violation of the encroachment agreement.
2. The Encroaching party or their contractor shall provide the following notices prior to construction activity within the NCDOT Right of Way:
   a. Three (3) business days advance phone call Mr. Troy Baker, Senior Assistant District Engineer at telephone (910) 364-0601 or email to tlbaker@ncdot.gov to the District Engineer's office.

   Failure to provide these notifications prior to beginning construction is subject to the Division Engineer's discretion to cease construction activity for this encroachment. NCDOT reserves the right to cease any construction or maintenance work associated with this installation by the encroaching party until the construction or maintenance meets the satisfaction of the Division Engineer or their representative.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION SIX / DISTRICT TWO
POST OFFICE BOX 1150
FAYETTEVILLE, NC 28302

Telephone: (910) 364-0601
Fax: (910) 437-2529
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
600 SOUTHERN AVENUE
FAYETTEVILLE, NC 28306

3. Prior to beginning work, it is the requirement of the Encroaching Party to contact the appropriate Utility Companies involved and make arrangements to adjust or relocate any utilities that conflict with the proposed work.
4. It shall be the responsibility of the encroaching party to determine the location of utilities within the encroachment area. NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act requires underground utilities to be located by calling 811 prior to construction. The encroaching party shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruption to existing facilities and maintain access to them.
5. The encroaching party shall notify the appropriate municipal office prior to beginning any work within the municipality's limits of jurisdiction.
6. Excavation within 1000 feet of a signalized intersection will require notification by the encroaching party to the Division Traffic Engineer at telephone number (910) 364-0606 no less than one week prior to beginning work. All traffic signal or detection cables must be located prior to excavation. Cost to replace or repair NCDOT signs, signals, pavement markings or associated equipment and facilities shall be the responsibility of the encroaching party.
7. This agreement does not authorize installations within nor encroachment onto railroad rights of way. Permits for installations within railroad right of way must be obtained from the railroad and are the responsibility of the encroaching party.
8. At the option of the District Engineer, a preconstruction meeting including representatives of NCDOT, the encroaching party, contractors and municipality, if applicable, shall be required. A pre-construction conference held between a municipality (or other facility owner) and a contractor without the presence of NCDOT personnel with subsequent construction commencing may be subject to NCDOT personnel ceasing any work on NCDOT right-of-way related to this encroachment until such meeting is held. Contact the District office to schedule.
9. **A NOTIFICATION FOR UTILITY / NON-UTILITY ENCROACHMENT WITHIN NCDOT R/W form (See corresponding attachment) with the scheduled pre-construction meeting and associated construction schedule details must be completed and submitted to the District Engineer's office a minimum of one week prior to construction.**
10. **A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.**

Legal & Right-of-Way Issues

11. This approval and associated plans and supporting documents shall not be interpreted to allow any design change or change in the intent of the design by the Owner, Design Engineer, or any of their representatives. Any revisions or changes to these approved plans or intent for construction must be obtained in writing from the Division Engineer's office or their representative prior to construction or during construction, if an issue arises during construction to warrant changes.
12. NCDOT does not guarantee the right of way on this road, nor will it be responsible for any claim for damages brought about by any property owner by reason of this installation. It is the responsibility of the encroaching party to verify the right of way.
13. Encroaching party shall be responsible for obtaining all necessary permanent and/or temporary construction, drainage, utility and/or sight distance easements.
14. All Right of Way and easements necessary for construction and maintenance shall be dedicated to NCDOT with proof of dedication furnished to the District Engineer prior to beginning work.
15. No commercial advertising shall be allowed within NCDOT Right of Way.
16. The encroaching party shall obtain proper approval from all affected pole owners prior to attachment to any pole.
17. The installation within the Control of Access fence shall not adversely affect the design, construction, maintenance, stability, traffic safety or operation of the controlled access highway, and the utility must be serviced without access from the through-traffic roadways or ramps.

Bonds

18. **A Performance and Indemnity Bond in the amount of $100,000.00 shall be posted with the District Engineer's Office by the Party of the Second Part prior to beginning any work within the NCDOT Right of Way. The bond shall be held for a minimum of one year after a satisfactory final inspection of the installation by NCDOT. The bond may be held for a period longer than one year after completion if, in the opinion of NCDOT, the size or complexity of the installation warrants a longer period.**
19. The release of the bond is subject to a final inspection by NCDOT. Contact the District office to schedule a Final Inspection and to request release of the bond.
20. **The encroaching party shall provide a signed and sealed letter from a Professional Engineer certifying that the materials and construction associated with the encroachment agreement were in compliance with the approved plans, agreement, and the current NCDOT Standard Specifications and Standard Drawings. All testing results (asphalt, concrete, compaction, etc.), records (inspector daily diary reports, materials received reports, etc.) associated with the improvements required by this encroachment agreement shall be submitted to the District Engineer upon completion of the project.**

Work Zone Traffic

21. Traffic control shall be coordinated with the District Engineer and the Division Traffic Engineer, Mr. Frank West at telephone (910) 364-0606, prior to construction.

22. WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

    All personnel performing any activity inside the highway right of way are required to be familiar with the NCDOT Maintenance / Utility Traffic Control Guidelines (MUTCG). No specific training course or test is required for qualification in the Maintenance /Utility Traffic Control Guidelines (MUTCG).

    All flagging, spotting, or operating Automated Flagger Assist Devices (AFAD) inside the highway right of way requires qualified and trained Work Zone Flaggers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel involved with the installation of Work Zone Traffic Control devices inside the highway right of way are required to be qualified and trained Work Zone Installers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel in charge of overseeing work zone Temporary Traffic Control operations and installations inside the highway right of way are required to be qualified and trained Work Zone Supervisors. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    For questions and/or additional information regarding this training program please refer to https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx or call the NCDOT Work Zone Traffic Control Section (919) 814-5000.

23. The party of the second part shall employ traffic control measures that are in accordance with the prevailing federal, state, local, and NCDOT policies, standards, and procedures. These policies, standards, and procedures include, but are not limited to the following:
    a. Manual on Uniform Traffic Control Devices (MUTCD) – North Carolina has adopted the MUTCD to provide basic principles and guidelines for traffic control device design, application, installation, and maintenance. North Carolina uses the MUTCD as a minimum requirement where higher supplemental standards specific to North Carolina are not established. Use fundamental principles and best practices of MUTCD (Part 6, Temporary Traffic Control).
    b. NCDOT Maintenance / Utility Traffic Control Guidelines – This document enhances the fundamental principles and best practices established in MUTCD Part 6, Temporary Traffic Control, incorporating NCDOT-specific standards and details. It also covers important safety knowledge for a wide range of work zone job responsibilities.

24. If the Traffic Control Supervisor determines that portable concrete barrier (PCB) is required to shield a hazard within the clear zone, then PCB shall be designed and sealed by a licensed North Carolina Professional Engineer. PCB plans and design calculations shall be submitted to the District Engineer for review and approval prior to installation.

25. **Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to police, EMS and fire stations, fire hydrants, secondary schools, and hospitals.**

26. Traffic shall be maintained at all times. All lanes of traffic are to be open during the hours of 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Monday through Friday, during any time of inclement weather, **or as directed by the District Engineer**. No lane of traffic shall be closed on holidays, special events, or as directed by the engineer. Any violation of these hours will result in ceasing any further construction by the Encroaching Party or their contractor.
27. Nighttime and weekend operations will NOT be allowed unless written approval is received from the District Engineer. If nighttime or weekend work is allowed or required, all signs must be retro-reflective, and a work zone lighting plan must be submitted for approval prior to construction.
28. Two-way traffic shall be maintained at all times unless designated by the District Engineer. Traffic shall not be rerouted or detoured without the prior written approval from the District Engineer. No utility work will be allowed on state holidays from 7:00 PM the night before through 9:00 AM the day prior to, following or during local events without prior approval from the District Engineer. If the construction is within 1000 feet of a school location or on a designated bus route, the construction shall be coordinated with the school start and end times to avoid traffic delays.
29. Work requiring lane or shoulder closures shall not be performed on both sides of the road simultaneously within the same area.
30. Any work requiring equipment or personnel within 5 feet of the edge of any travel lane of an undivided facility and within 10 feet of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers per current *NCDOT Roadway Standard Drawings or MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES*.
31. At the discretion of the District Engineer, a traffic control plan shall be developed and submitted under the seal and signature of a Licensed North Carolina Professional Engineer prior to construction. The plan shall be specific to the site and adequately detailed. Issues such as the close proximity to intersections shall be addressed.
32. Temporary and final pavement markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted with the encroachment request to the Division Traffic Engineer prior to construction. Final pavement markings shall be thermoplastic unless otherwise directed by the Division Traffic Engineer or District Engineer.
33. Any pavement markings that are damaged or obliterated shall be restored by the encroaching party at no expense to NCDOT.
34. Sidewalk closures shall be installed as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with The American with Disabilities Act Accessibility Guidelines. The encroaching party must adhere to the guidelines for accommodating pedestrians in encroachment work zones as described in the NCDOT Pedestrian Work Zone Accommodations Training found at https://www.youtube.com/watch?v=AOuYa5IW3dg&feature=youtu.be

Roadside Environmental

35. The encroaching party shall comply with all applicable Federal, State and local environmental regulations and shall obtain all necessary Federal, State and local environmental permits, including but not limited to, those related to sediment control, stormwater, wetland, streams, endangered species and historical sites. Additional information can be obtained by contacting the NCDOT Roadside Environmental Engineer regarding the North Carolina Natural Heritage Program or the United States Fish and Wildlife Services. Contact the Division Roadside Environmental Engineer's Office at (910) 364-0603.
36. When surface area in excess of one acre will be disturbed, the Encroacher shall submit a Sediment and Erosion Control Plan which has been approved by the appropriate regulatory agency or authority prior to beginning any work on the Right of Way. Failure to provide this information shall be grounds for suspension of operations. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with the approved sediment and erosion control plan.
37. The Verification of Compliance with Environmental Regulations (VCER-1) form is required for all non-utility encroachment agreements or any utility encroachments when land disturbance within NCDOT right of way exceeds 1 acre. The VCER-1 form must be PE sealed by a NC registered professional engineer who has verified that all appropriate environmental permits (if applicable) have been obtained and all applicable environmental regulations have been followed.
38. All erosion control devices and measures shall be constructed, installed, maintained, and removed by the Encroacher in accordance with all applicable Federal, State, and Local laws, regulations, ordinances, and policies. Permanent vegetation shall be established on all disturbed areas in accordance with the recommendations of the Division Roadside Environmental Engineer. All areas disturbed (shoulders, ditches, removed accesses, etc.) shall be graded and seeded in accordance with the latest *NCDOT Standards Specifications for Roads and Structures* and within 15 calendar days with an approved NCDOT seed mixture (all lawn type areas shall be maintained and reseeded as such). Seeding rates per acre shall be applied according to the Division Roadside Environmental Engineer. Any plant or vegetation in the NCDOT planted sites that is destroyed or damaged as a result of this encroachment shall be replaced with plants of like kind or similar shape.
39. **No trees within NCDOT shall be cut without authorization from the Division Roadside Environmental Engineer. An inventory of trees measuring greater than 4 caliper inches (measured 6" above the ground) is required when trees within C/A right of way will be impacted by the encroachment installation. Mitigation is required and will be determined by the Division Roadside Environmental Engineer's Office.**
40. Prior to installation, the Encroaching Party shall contact the District Engineer to discuss any environmental issues associated with the installation to address concerns related to the root system of trees impacted by boring or non-utility construction of sidewalk, roadway widening, etc.

41. The applicant is responsible for identifying project impacts to waters of the United States (wetlands, intermittent streams, perennial streams and ponds) located within the NCDOT right-of-way. The discharge of dredged or fill material into waters of the United States requires authorization from the United States Army Corps of Engineers (USACE) and certification from the North Carolina Division of Water Quality (NCDWQ). The applicant is required to obtain pertinent permits or certification from these regulatory agencies if construction of the project impacts waters of the United States within the NCDOT right-of-way. The applicant is responsible for complying with any river or stream Riparian Buffer Rule as regulated by the NCDWQ. The Rule regulates activity within a 50-foot buffer along perennial streams, intermittent streams and ponds. Additional information can be obtained by contacting the NCDWQ or the USACE.
42. The contractor shall not begin the construction until after the traffic control and erosion control devices have been installed to the satisfaction of the Division Engineer or their agent.
43. The contractor shall perform all monitoring and record keeping and any required maintenance of erosion and sediment control measures to maintain compliance with stormwater regulations.

STIP (or Division Managed) Projects

~~44. State Transportation Improvement Project (STIP) ** XXXXXX is scheduled for future construction. Any encroachment determined to be in conflict with the construction of this NCDOT project shall be removed and/or relocated at the encroaching party's expense.~~

Construction

General

45. An executed copy of the encroachment agreement, provisions and approved plans shall be present at the construction site at all times. If safety or traffic conditions warrant such an action, NCDOT reserves the right to further limit, restrict or suspend operations within the right of way.
46. The Encroaching Party and/or their Contractor shall comply with all OSHA requirements. If OSHA visits the work area associated with this encroachment, the District Office shall be notified by the encroaching party immediately if any violations are cited.
47. Any REVISIONS marked in RED on the attached non-PE sealed plans shall be incorporated into and made part of the approved encroachment agreement.
48. All disturbed areas are to be fully restored to current NCDOT minimum roadway standards or as directed by the Division Engineer or their representative. Disturbed areas within NCDOT Right-of-Way include, but not limited to, any excavation areas, pavement removal, drainage or other features.
49. The encroaching party shall notify the Division Engineer or their representative immediately in the event any drainage structure is blocked, disturbed or damaged. All drainage structures disturbed, damaged or blocked shall be restored to its original condition as directed by the Division Engineer or their representative.
50. VARIANCE GRANTED FOR THIS ENCROACHMENT AGREEMENT: ~~A minimum of 5 feet clearance is required for utility installations beneath or near drainage pipes, headwalls, and a minimum of two-foot clearance below the flowline of streams. If directional drilling, a minimum ten-foot clearance distance is required from drainage structures and a minimum of 5 feet below flowline of streams.~~

51. At points where the utility is placed under existing storm drainage, the trench will be backfilled with excavatable flowable fill up to the outside diameter of the existing pipe.
52. Unless specified otherwise, during non-working hours, equipment shall be located away from the job site or parked as close to the right of way line as possible and be properly barricaded in order not to have any equipment obstruction within the Clear Recovery Area. Also, during non-working hours, no parking or material storage shall be allowed along the shoulders of any state-maintained roadway.
53. No access to the job site, parking or material storage shall be allowed along or from the **Control of Access Roadway.**
54. Guardrail removed or damaged during construction shall be replaced or repaired to its original condition, meeting current NCDOT standards or as directed by the Division Engineer or their representative.
55. The resetting of the Control of Access fence shall be in accordance with the applicable NCDOT standard and as directed by the Division Engineer or their representative.
56. Right of Way monuments disturbed during construction shall be referenced by a registered Land Surveyor and reset after construction.
57. All traffic signs moved during construction shall be reinstalled as soon as possible to the satisfaction of the Division Engineer or their representative.
58. Any utility markers, cabinets, pedestals, meter bases and services for meter reading required shall be as close to the Right of Way line as possible. If it is not feasible to install at or near Right of Way line, then written approval shall be obtained from NCDOT prior to installation.
59. Detection tape, where required by NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act, shall be buried in the trench approximately 1 foot above the installed facility. Where conduit is installed in the right of way and is not of ferrous material, locating tape or detection wire shall be installed with the conduit.
60. All driveways disturbed during construction shall be returned to a state comparable with the condition of the driveways prior to construction.
61. Any proposed driveway connections onto NCDOT roadways will require an approved driveway permit. The approval of this encroachment agreement does not constitute approval of any proposed driveway connections. For further information, contact Mr. Troy L. Baker, Senior Assistant District Engineer at (910) 364-0601.
62. Conformance with driveway permit review should be required in conjunction with this encroachment agreement. In the event there is a conflict between the driveway permit and the encroachment agreement, the District Engineer should resolve the conflict and notify the parties involved.
63. **If the approved method of construction is unsuccessful and other means are required, prior approval must be obtained through the District Engineer before construction may continue.**
64. The encroaching party and their construction contractor must sign and submit the NCDOT *Workforce Safety Plan for Encroachment Activities: COVID-19* form to the District Engineer prior to construction.

Engineering

65. All traffic control, asphalt mixes, structures, construction, workmanship and construction methods, and materials shall be in compliance with the most-recent versions of the following resources: *ASTM Standards*, *Manual on Uniform Traffic Control Devices*, *NCDOT Utilities Accommodations Manual*, *NCDOT Standard Specifications for Roads and Structures*, *NCDOT Roadway Standard Drawings*, NCDOT *Asphalt Quality Management System* manual, **and the approved plans.**
66. Prior approval for any blasting must be obtained from the Division Engineer or their representative.
67. Regulator stations, metering stations, cathodic test stations, and anode beds are not permitted within NCDOT right of way. Header wires are permitted.
68. Non-Utility Communication and Data Transmission installations (ground mounted type or Small Cell pole-mounted type) must adhere to guidelines in the Utilities Accommodations Manual and, when located within municipal jurisdictions, are subject to review and approval by municipal ordinances and any additional municipal approval for proximity to historic districts and landmarks. All wiring and related telecommunications work shall conform to the latest regulations by the Federal Communications Commission.
69. All wiring and related electrical work shall conform to the latest edition of the National Electrical Safety Code.

Location within R/W

70. All utility access points, such as manholes, vaults, handholes, splice boxes and junction boxes shall be located as close to the right of way line as possible and shall not be placed in the ditch line, side slopes of the ditches or in the pavement. All manholes, handholes, splice boxes, junction boxes and vaults and covers shall be flush with the ground when located within the vehicle clear zone. Slack loops for telecommunications in industry standard housing units shall be buried a minimum of 18 inches when buried or meet minimum NCDOT vertical and horizontal clearances when installed aerially.
71. Fire Hydrants shall be of the breakaway type. Hydrants shall be placed near the right of way line. In curb and gutter sections with written approval from the District, the hydrants may be placed at 6' behind the back of the curb or minimum 2’ back of sidewalk.
72. Luminaire and/or utility poles and guy wires shall be set as close to the Right of Way line as practical and outside the Clear Zone in accordance with the latest version of the AASHTO Roadside Design Guide (See corresponding attachment) or made breakaway in accordance with the requirements of NCHRP Report 350. Any relocation of the utility poles from the original design due to Clear Zone requirements shall require a re-submittal for the utility design.
73. Luminaire and/or utility poles shall be set a minimum of 5’-6” behind face of any guardrail or otherwise sufficiently protected. However, standard placement may be reduced to 3’-6” behind face of guardrail when posts are spaced 3’-1 ½”, or where speed limit is less than 55 MPH.

74. Hot box (aka ASSE 1060) or Safe-T-Cover type enclosures covering utility main pipe joints, backflow preventers, valves, vent pipes, cross connections, pumps, grinders, irrigation assemblies, transformers, generators, and other similar large appurtenances shall be located outside sight distance triangles and off of the NCDOT Right-of-Way.

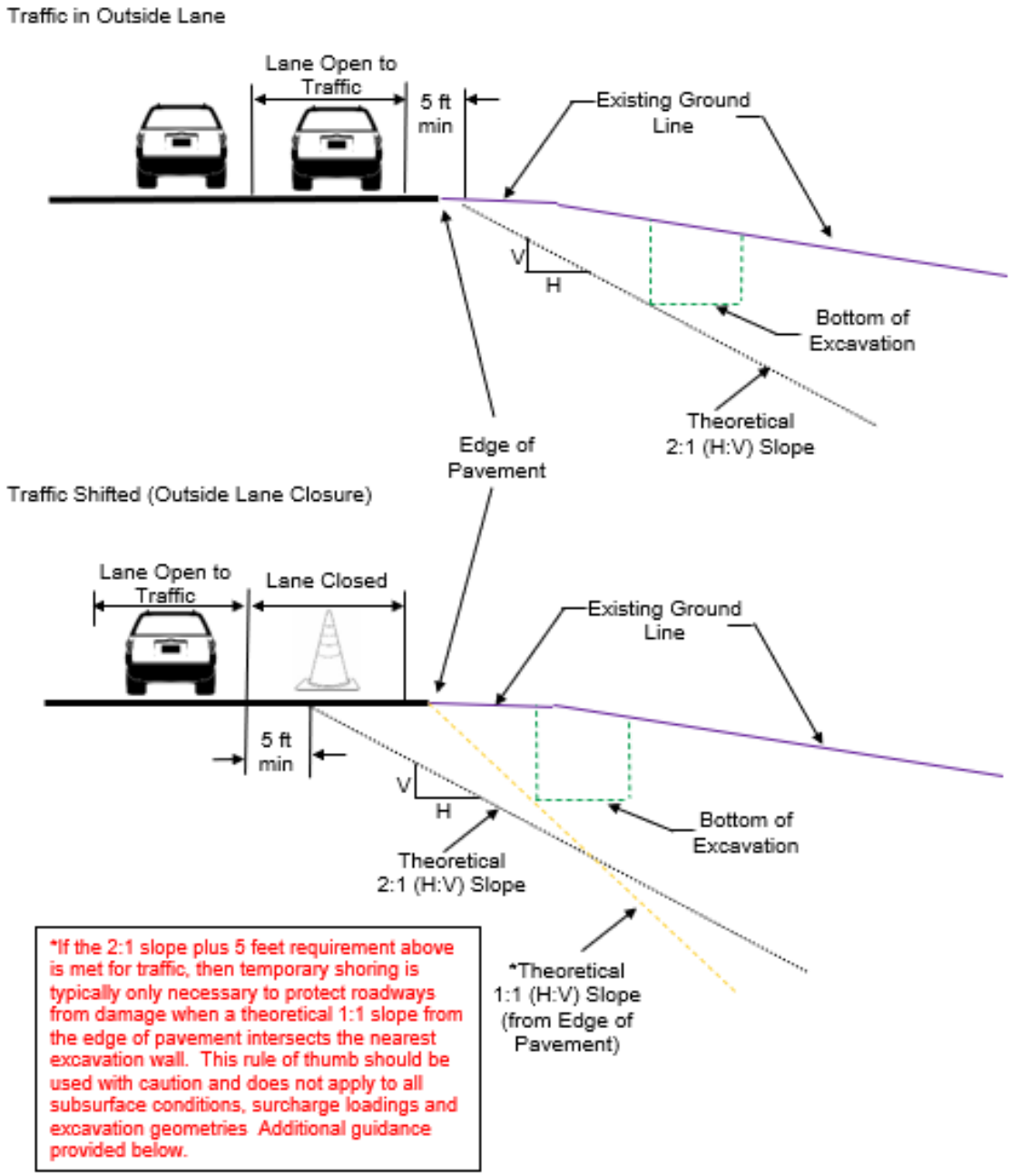
75. Sprinkler heads shall be located a minimum of 10 feet from the edge of pavement, edge of shoulder, or back of curb whichever is greater and shall be directed so that water does not spray or drain on the roadway surface, sidewalk, or passing vehicles at any time. Upon completion of the installation and prior to activation of the system, the Encroacher shall contact the District Engineer to schedule a test of the system to verify the spray pattern. Sprinkler systems shall not be operated during periods of high wind or freezing weather, or to the extent that the subgrade adjacent to the pavement structure becomes saturated. NCDOT reserves the right to require immediate termination and removal of any sprinkler system which in its judgement and opinion adversely affects safety, maintenance, or operation of the roadway.

Excavation

76. Excavation material shall not be placed on pavement.

77. It is the responsibility of the encroaching party or their contractor to prevent any mud/dirt from tracking onto the roadway. Any dirt which may collect on the roadway pavement from equipment and/or truck traffic on site shall be immediately removed to avoid any unsafe traffic conditions.

78. ~~The utility shall be installed within 5 feet of the right of way line and outside the 5-foot minimum from travel lane plus theoretical 2:1 slope from the edge of pavement to the bottom of the nearest excavation wall for temporary shoring. Temporary shoring is required when a theoretical 2:1 slope from the bottom of excavation will intersect the existing ground line less than 5 feet from the outside edge of an open travel lane as shown in the figure below or when a theoretical 2:1 slope from the bottom of excavation will intersect any existing structure, support, utility, property, etc. to be protected.~~



If the 2:1 slope plus 5 feet requirement above is met for traffic, then temporary shoring is typically only necessary to protect roadways from damage when a theoretical 1:1 slope from the edge of pavement intersects the nearest excavation wall. This rule of thumb should be used with caution and does not apply to all subsurface conditions, surcharge loadings and excavation geometries. Situations where this 1:1 slope is not recommended include groundwater depth is above bottom of excavation or excavation is deeper than 10 feet or in Type B or C soils as defined by OSHA Technical Manual. Temporary shoring may be avoided by locating trenches, bore pits, and other excavations far enough away from the open travel lane, edge of pavement and any existing structure, support, utility, property, etc. to be protected.

Temporary shoring shall be designed and constructed in accordance with current NCDOT Standard Temporary Shoring provisions (refer to https://connect.ncdot.gov/resources/Specifications/Pages/2018-Specifications-and-Special-Provisions.aspx and see SP11 R002

a. Temporary excavation shoring, such as sheet piling, shall be installed. The design of the shoring shall include the effects of traffic loads. The shoring system shall be designed and sealed by a licensed North Carolina Professional Engineer. Shoring plans and design calculations shall be submitted to the Division Engineer for review and approval prior to construction. (See NCDOT *Utilities Accommodations Manual* for more information on requirements for shoring plans, design calculations, and subsurface investigation report.) **Trench boxes shall not be accepted as temporary shoring and will not be approved for use in instances where shoring is required to protect the highway, drainage structure, and/or supporting pavement or structure foundation**.

b. All trench excavation inside the limits of the theoretical two-to-one slope plus 5 feet requirement, as defined by the policy, shall be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight. Any excavation that is not backfilled by the end of the workday must address any safety and traveling public concerns including accommodations for bicycles, pedestrians and persons with disabilities.

c. The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled in accordance with Section 300-7 of the latest *NCDOT Standard Specifications for Roads and Structures*, which basically requires the backfill material to be placed in layers not to exceed 6 inches loose and compacted to at least 95% of the density obtained by compacting a sample in accordance with AASHTO T99 as modified by DOT.

d. A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.

e. The length of parallel excavation shall be limited to the length necessary to install and backfill one joint of pipe at a time, not to exceed twenty-five (25) feet.

79. All material to a depth of 8 inches below the finished surface of the subgrade shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade. The option to backfill any trenches with dirt or either #57 stone or #78 stone with consolidation with a plate tamp and without a conventional density test may be pursued with the written consent of the District Engineer. If this option is exercised, then roadway ABC stone and asphalt repair as required will also be specified by the District Engineer.

Directional bore

80. Boring equipment will be provided of a type and size to facilitate boring in the local geologic conditions and shall be able to facilitate the encroachment work.

81. When Horizontal Directional Drilling (HDD) is used, the following stipulations apply:

    a. Use drilling fluids as appropriate for the type soils but use of water alone is prohibited. Pump drilling fluids only while drilling or reaming. Directional boring using jetting with a Bentonite (or equivalent material) slurry is recommended. Monitor flow rates to match the amount leaving the bore hole and do not increase pressure or flow to free stuck drill heads, reamers or piping. Open cutting to retrieve stuck drill heads is not allowed without prior permission from the District Engineer.

    b. The minimum depth shall adhere to the table below for transverse (under non-controlled access, partial controlled access, or limited controlled access roadway) installations and refers to maximum diameter of hole drilled and not the dimension of the carrier or encasement pipe.

Diameter of Drilled Hole (Backream)	Minimum Depth of Cover
2" to 6”	5 feet
>6” to 15”	12 times hole diameter (e.g. 6-inch hole means 6 feet minimum depth)
>15” to 36”	15 feet or greater

    c. Under fully controlled access roadway installations, the minimum depth for transverse crossings shall be 15 feet under any pavement (ramps or thru lanes)

    d. An overbore (backream diameter) shall not be more than 1.5 times the outside diameter of the pipe or encasement under any highway for pipes 12 inches in diameter or less. For pipes with outer diameter larger than 12 inches, the overbore may be no larger than outer diameter of pipe plus 6 inches. An overbore exceeding 1.5 times greater than the outside diameter of the pipe or encasement may be considered if the encroachment agreement includes a statement signed and sealed by a licensed North Carolina Professional Engineer indicating that an overbore in excess of 1.5 times the outside diameter of the pipe or encasement will appropriately arch and no damage will be done to the pavement or sub-grade.

    e. Directional boring is allowed beneath embankment material in naturally occurring soil.

    f. Any parallel installation utilizing the directional boring method shall be made at a minimum depth of three (3’) feet (cover) below the ground surface and outside the theoretical 1:1 slope from the existing edge of pavement except where the parallel installation crosses a paved roadway.

g. All directional bores shall maintain ten (10) feet minimum (clear) distance from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts or box culverts. Directional bores are not allowed beneath bridge footings, culvert wingwall footings, slope protection or retaining walls.
h. The tip of the drill string shall have a cutter head.
i. Detection wire shall be installed with non-ferrous material.
j. HDPE pipe installed by directional boring shall not be connected to existing pipe or fittings for one (1) week from the time of installation to allow tensional stresses to relax.

Aerial clearances

82. Vertical clearance of overhead power and communication lines shall meet the National Electrical Safety Code requirements except the minimum vertical clearance shall be 18' for crossings over NCDOT roadways (24' over Fully Controlled Access roadways) and 16' for parallel installations.

83. In relation to the bridge, the utility line shall be located with minimum clearances as indicated on the attachment for NCDOT **Required Clearances for Aerial Installations by Encroachment Near Bridge Structures**.

Pavement Detail and Repair

84. The paving of this roadway shall be in accordance with the latest version of the NCDOT Standard Specifications, Sections 610, 1012 and 1020. The Contractor shall follow all procedures of the Quality Management System (QMS) for asphalt pavement - Maintenance Version (see https://connect.ncdot.gov/resources/Materials/MaterialsResources/2018%20QMS%20Asphalt%20Manual.pdf). The Contractor must adhere to all testing requirements and quality control requirements specified. The Contractor shall contact the NCDOT Division QA Supervisor prior to producing plant mix and make the Supervisor aware that the mix is being produced for a future NCDOT road. Contact the District Engineer to determine the NCDOT Division QA Supervisor. Only NCDOT approved mix designs will be acceptable. A Quality Control Plan shall be submitted (as Directed by the District Engineer) to the District Engineer's Office prior to asphalt production utilizing form QMS-MV1. Failing mixes and/or densities are subject to penalties including monetary payments or removal and replacement. To minimize traffic queuing in construction areas, the possibility of traffic detours may be considered when working on high traffic routes even if traffic control is used. The District Engineer may require traffic detours.

85. When paving beyond utility installation is involved or as directed by the Engineer, a Roadway certification report sealed by a Professional Engineer shall be submitted to the District Engineer's office indicating the following:

- **Pavement thickness by type**
- **Pavement density, core and/or test locations**
- **Base thickness**
- **Base density**
- **Subgrade density**

Test frequency and method shall be in conformance with the NCDOT *Materials and Tests Manual*. Test must be performed by a Certified Technician including name and Certification number on report.

86. "Potholing" pavement cores to expose existing utilities shall be made with an 18" diameter keyhole pavement core. Pavement core locations shall not be placed in the wheel path whenever possible. Vacuum excavation shall be utilized to expose underground utilities. Pavement cores shall be repaired within the same working day. The pavement core shall be retained and reused to fill the core hole.

    The excavation shall be backfilled and compacted with select material to the bottom of the existing pavement structure or as indicated by the District Engineer. The retained core shall be placed in the hole and secured with a waterproof, mechanical joint. If the pavement core is damaged and cannot be re-used, the core may be replaced with the surface mix, S9.5B. The asphalt patch shall match the thickness of the existing asphalt or four inches, whichever is greater. All materials must be listed on the NCDOT Approved Products List (APL) found at: https://apps.ncdot.gov/vendor/approvedproducts/.

~~87. All open cuts (if permitted) on primary routes will require full depth patching with 5.0" of B 25.0 B (ACBC) Asphalt Concrete Base Course, 3.0" of I 19.0 B (ACIC) Asphalt Concrete Intermediate Course and 2.0" of S 9.5 B (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 2.0" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.~~

88. All open cuts (if permitted) on secondary routes will require full depth patching with 4.0" of B 25.0 C (ACBC) Asphalt Concrete Base Course and 3.0" of S 9.5 C (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 1.5" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.

89. Eight inches of ABC will be used as the base. Compaction test shall be performed at the location of every open cut that crosses NCDOT roadways. The owner will be required to have an approved laboratory furnish the District Office a copy of the test results.

90. The encroaching party will be required to mill at a depth of 0" – 1.5" for a distance of twenty-five feet (25') at the beginning and twenty-five feet (25') at the end of the project (each side of the required overlay) to allow for a smooth transition with the existing pavement as shown on the attached plans.

91. Pavement cuts shall be repaired the same day the cuts are made unless an asphalt patch cannot be accomplished the same day due to material availability or time restrictions. When the asphalt patch is not feasible, the following apply:
    a. The pavement cut shall be filled to the surface with ABC stone or Flowable Fill per NCDOT's Standards and Specifications.
    b. Once the cut is filled, a minimum ¾-inch steel plate shall be placed and pinned to prevent moving. Plates shall be designed large enough to span a minimum of 1-foot on all sides on the pavement cut.
    c. When flowable fill is used, it shall cure for 24 hours prior to any asphalt material placement. Flowable fill bleed water shall not be present during paving operations. Paving shall not cause damage (shoving, distortion, pumping, etc.) to the flowable fill.
    d. Install and leave "BUMP" signs according to MUTCD until the steel plate has been removed. Once the flowable fill has cured, remove the steel plate, and mill/fill according to the directions of the District Engineer.
    e. All pavement cuts must be sealed with NCDOT approved sealant to prevent future pavement separation or cracking.

92. **Any pavement damaged because of settlement of the pavement or damaged by equipment used to perform encroachment work, shall be re-surfaced to the satisfaction of the District Engineer. This may include the removal of pavement and a 50' mechanical overlay. All pavement work and pavement markings (temporary and final) are the responsibility of the Encroaching Party.**

93. All concrete installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

94. All concrete sidewalk installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01 and 848.01) and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

95. All ADA compliant curb ramps shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 848.06) and Amendments or Supplementals thereto including but not limited to the Alternate Curb Ramp Designs (Curb Ramp Details - Parallel Ramps). All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

96. All 30" curb and gutter within NCDOT rights of way shall be constructed with Class B concrete in accordance with Section 846 of the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01) and Amendment or Supplemental thereto or as directed by the engineer. All concrete testing results shall be provided to the District Engineer's office at time of project completion.

Post Construction

Close out/ Inspection

97. The Encroaching party shall notify the District Engineer's office within 2 business days after construction is complete. The District Engineer may perform a construction inspection. Any deficiencies may be noted and reported to the encroaching party to make immediate repairs or resolve any issues to restore the right-of-way to a similar condition prior to construction, including pavement, signage, traffic signals, pavement markings, drainage, structures/pipes, or other highway design features.

98. At the discretion of the District Engineer, a final inspection report may be provided to the encroaching party upon satisfactory completion of the work.

99. A written acknowledgement of the completed work by the District Engineer's office begins the one-year warranty period associated with the performance bond.

100. A copy of the "as-built" plan shall be submitted to the District Engineer's office in a PDF format and in a current ESRI GIS format within 4 weeks of construction along with an executed Certification Memo shall be submitted to the District Office (online encroachment database). The As-Built drawing(s) shall depict the horizontal and vertical locations of all utilities and associated appurtenances.

101. A copy (in PDF format) of the completed ground water analysis shall be given to the District Engineer, including detailed drawings of the "as-built" wells showing location, depth and water level in well.

If further information or assistance is needed in reference to this project, please feel free to call Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer at (910) 364-0601.

Sincerely,

DocuSigned by:
Greg W. Burns
C2649BD929294B9...

DS
TLB

Greg W. Burns, PE
Division Engineer

GWB:tlb

cc: https://connect.ncdot.gov/site/Permits/Pages/All-Submissions.aspx

B.6
NCDOT Encroachment E062-026-20-00169
(Mariners Landing Drive)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

March 15, 2021

Mr. David W. Trego, CEO/General Manager
Public Works Commission
ATTN: Mrs. Misty Manning, PE, Water Resources Engineering Manager
Post Office Box 1089
Fayetteville, NC 28302

SUBJECT: Encroachment Agreement on SR 4164 (Mariners Landing Drive) in Cumberland County (E062-026-20-00169).

Dear Sir:

Attached is an approved R/W form 16.1 and plans for the installation of 2,130'± of 24"Φ PVC (SDR-26) sanitary sewer main (40'± encased in 36" Φ steel), seventeen (17) - five (5) foot Φ sanitary sewer traffic bearing manholes with associated appurtenances by open cut and bore and jack methods on SR 4164 (Mariners Landing Drive) as associated with the Big Rockfish Creek Outfall project in Cumberland County as shown on the attached plans (PWC encroachment #18844 – AWS 15313ZZZ).

Location:

Route	**At a point**	**Towards**
SR 4164	150'± southwest of the intersection of SR 4164 (Mariners Landing Drive) and SR 4165 (Deep Chanel Court)	2,130'± to the southwest

This encroachment is approved subject to the following:

Pre-Construction

Contact Offices & Outside Agency issues/contacts/info

1. Approval may be rescinded upon failure to follow any of the provisions in this permit and may be considered a violation of the encroachment agreement.
2. The Encroaching party or their contractor shall provide the following notices prior to construction activity within the NCDOT Right of Way:
   a. Three (3) business days advance phone call Mr. Troy Baker, Senior Assistant District Engineer at telephone (910) 364-0601 or email to tlbaker@ncdot.gov to the District Engineer's office.

   Failure to provide these notifications prior to beginning construction is subject to the Division Engineer's discretion to cease construction activity for this encroachment. NCDOT reserves the right to cease any construction or maintenance work associated with this installation by the encroaching party until the construction or maintenance meets the satisfaction of the Division Engineer or their representative.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION SIX / DISTRICT TWO
POST OFFICE BOX 1150
FAYETTEVILLE, NC 28302

Telephone: (910) 364-0601
Fax: (910) 437-2529
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
600 SOUTHERN AVENUE
FAYETTEVILLE, NC 28306

3. Prior to beginning work, it is the requirement of the Encroaching Party to contact the appropriate Utility Companies involved and make arrangements to adjust or relocate any utilities that conflict with the proposed work.
4. It shall be the responsibility of the encroaching party to determine the location of utilities within the encroachment area. NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act requires underground utilities to be located by calling 811 prior to construction. The encroaching party shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruption to existing facilities and maintain access to them.
5. The encroaching party shall notify the appropriate municipal office prior to beginning any work within the municipality's limits of jurisdiction.
6. Excavation within 1000 feet of a signalized intersection will require notification by the encroaching party to the Division Traffic Engineer at telephone number (910) 364-0606 no less than one week prior to beginning work. All traffic signal or detection cables must be located prior to excavation. Cost to replace or repair NCDOT signs, signals, pavement markings or associated equipment and facilities shall be the responsibility of the encroaching party.
7. This agreement does not authorize installations within nor encroachment onto railroad rights of way. Permits for installations within railroad right of way must be obtained from the railroad and are the responsibility of the encroaching party.
8. At the option of the District Engineer, a preconstruction meeting including representatives of NCDOT, the encroaching party, contractors and municipality, if applicable, shall be required. A pre-construction conference held between a municipality (or other facility owner) and a contractor without the presence of NCDOT personnel with subsequent construction commencing may be subject to NCDOT personnel ceasing any work on NCDOT right-of-way related to this encroachment until such meeting is held. Contact the District office to schedule.
9. **A NOTIFICATION FOR UTILITY / NON-UTILITY ENCROACHMENT WITHIN NCDOT R/W form (See corresponding attachment) with the scheduled pre-construction meeting and associated construction schedule details must be completed and submitted to the District Engineer's office a minimum of one week prior to construction.**
10. **A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.**

Legal & Right-of-Way Issues

11. This approval and associated plans and supporting documents shall not be interpreted to allow any design change or change in the intent of the design by the Owner, Design Engineer, or any of their representatives. Any revisions or changes to these approved plans or intent for construction must be obtained in writing from the Division Engineer's office or their representative prior to construction or during construction, if an issue arises during construction to warrant changes.
12. NCDOT does not guarantee the right of way on this road, nor will it be responsible for any claim for damages brought about by any property owner by reason of this installation. It is the responsibility of the encroaching party to verify the right of way.
13. Encroaching party shall be responsible for obtaining all necessary permanent and/or temporary construction, drainage, utility and/or sight distance easements.
14. All Right of Way and easements necessary for construction and maintenance shall be dedicated to NCDOT with proof of dedication furnished to the District Engineer prior to beginning work.
15. No commercial advertising shall be allowed within NCDOT Right of Way.
16. The encroaching party shall obtain proper approval from all affected pole owners prior to attachment to any pole.
17. The installation within the Control of Access fence shall not adversely affect the design, construction, maintenance, stability, traffic safety or operation of the controlled access highway, and the utility must be serviced without access from the through-traffic roadways or ramps.

Bonds

18. **A Performance and Indemnity Bond in the amount of $513,000.00 shall be posted with the District Engineer's Office by the Party of the Second Part prior to beginning any work within the NCDOT Right of Way. The bond shall be held for a minimum of one year after a satisfactory final inspection of the installation by NCDOT. The bond may be held for a period longer than one year after completion if, in the opinion of NCDOT, the size or complexity of the installation warrants a longer period.**
19. The release of the bond is subject to a final inspection by NCDOT. Contact the District office to schedule a Final Inspection and to request release of the bond.
20. **The encroaching party shall provide a signed and sealed letter from a Professional Engineer certifying that the materials and construction associated with the encroachment agreement were in compliance with the approved plans, agreement, and the current NCDOT Standard Specifications and Standard Drawings. All testing results (asphalt, concrete, compaction, etc.), records (inspector daily diary reports, materials received reports, etc.) associated with the improvements required by this encroachment agreement shall be submitted to the District Engineer upon completion of the project.**

Work Zone Traffic

21. Traffic control shall be coordinated with the District Engineer and the Division Traffic Engineer, Mr. Frank West at telephone (910) 364-0606, prior to construction.

22. WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

    All personnel performing any activity inside the highway right of way are required to be familiar with the NCDOT Maintenance / Utility Traffic Control Guidelines (MUTCG). No specific training course or test is required for qualification in the Maintenance /Utility Traffic Control Guidelines (MUTCG).

    All flagging, spotting, or operating Automated Flagger Assist Devices (AFAD) inside the highway right of way requires qualified and trained Work Zone Flaggers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel involved with the installation of Work Zone Traffic Control devices inside the highway right of way are required to be qualified and trained Work Zone Installers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel in charge of overseeing work zone Temporary Traffic Control operations and installations inside the highway right of way are required to be qualified and trained Work Zone Supervisors. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    For questions and/or additional information regarding this training program please refer to https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx or call the NCDOT Work Zone Traffic Control Section (919) 814-5000.

23. The party of the second part shall employ traffic control measures that are in accordance with the prevailing federal, state, local, and NCDOT policies, standards, and procedures. These policies, standards, and procedures include, but are not limited to the following:
    a. Manual on Uniform Traffic Control Devices (MUTCD) – North Carolina has adopted the MUTCD to provide basic principles and guidelines for traffic control device design, application, installation, and maintenance. North Carolina uses the MUTCD as a minimum requirement where higher supplemental standards specific to North Carolina are not established. Use fundamental principles and best practices of MUTCD (Part 6, Temporary Traffic Control).
    b. NCDOT Maintenance / Utility Traffic Control Guidelines – This document enhances the fundamental principles and best practices established in MUTCD Part 6, Temporary Traffic Control, incorporating NCDOT-specific standards and details. It also covers important safety knowledge for a wide range of work zone job responsibilities.

24. If the Traffic Control Supervisor determines that portable concrete barrier (PCB) is required to shield a hazard within the clear zone, then PCB shall be designed and sealed by a licensed North Carolina Professional Engineer. PCB plans and design calculations shall be submitted to the District Engineer for review and approval prior to installation.

25. **Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to police, EMS and fire stations, fire hydrants, secondary schools, and hospitals.**

26. Traffic shall be maintained at all times. All lanes of traffic are to be open during the hours of 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Monday through Friday, during any time of inclement weather, **or as directed by the District Engineer**. No lane of traffic shall be closed on holidays, special events, or as directed by the engineer. Any violation of these hours will result in ceasing any further construction by the Encroaching Party or their contractor.
27. Nighttime and weekend operations will NOT be allowed unless written approval is received from the District Engineer. If nighttime or weekend work is allowed or required, all signs must be retro-reflective, and a work zone lighting plan must be submitted for approval prior to construction.
28. Two-way traffic shall be maintained at all times unless designated by the District Engineer. Traffic shall not be rerouted or detoured without the prior written approval from the District Engineer. No utility work will be allowed on state holidays from 7:00 PM the night before through 9:00 AM the day prior to, following or during local events without prior approval from the District Engineer. If the construction is within 1000 feet of a school location or on a designated bus route, the construction shall be coordinated with the school start and end times to avoid traffic delays.
29. Work requiring lane or shoulder closures shall not be performed on both sides of the road simultaneously within the same area.
30. Any work requiring equipment or personnel within 5 feet of the edge of any travel lane of an undivided facility and within 10 feet of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers per current *NCDOT Roadway Standard Drawings or MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES*.
31. At the discretion of the District Engineer, a traffic control plan shall be developed and submitted under the seal and signature of a Licensed North Carolina Professional Engineer prior to construction. The plan shall be specific to the site and adequately detailed. Issues such as the close proximity to intersections shall be addressed.
32. Temporary and final pavement markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted with the encroachment request to the Division Traffic Engineer prior to construction. Final pavement markings shall be thermoplastic unless otherwise directed by the Division Traffic Engineer or District Engineer.
33. Any pavement markings that are damaged or obliterated shall be restored by the encroaching party at no expense to NCDOT.
34. Sidewalk closures shall be installed as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with The American with Disabilities Act Accessibility Guidelines. The encroaching party must adhere to the guidelines for accommodating pedestrians in encroachment work zones as described in the NCDOT Pedestrian Work Zone Accommodations Training found at https://www.youtube.com/watch?v=AOuYa5IW3dg&feature=youtu.be

Roadside Environmental

35. The encroaching party shall comply with all applicable Federal, State and local environmental regulations and shall obtain all necessary Federal, State and local environmental permits, including but not limited to, those related to sediment control, stormwater, wetland, streams, endangered species and historical sites. Additional information can be obtained by contacting the NCDOT Roadside Environmental Engineer regarding the North Carolina Natural Heritage Program or the United States Fish and Wildlife Services. Contact the Division Roadside Environmental Engineer's Office at (910) 364-0603.
36. When surface area in excess of one acre will be disturbed, the Encroacher shall submit a Sediment and Erosion Control Plan which has been approved by the appropriate regulatory agency or authority prior to beginning any work on the Right of Way. Failure to provide this information shall be grounds for suspension of operations. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with the approved sediment and erosion control plan.
37. The Verification of Compliance with Environmental Regulations (VCER-1) form is required for all non-utility encroachment agreements or any utility encroachments when land disturbance within NCDOT right of way exceeds 1 acre. The VCER-1 form must be PE sealed by a NC registered professional engineer who has verified that all appropriate environmental permits (if applicable) have been obtained and all applicable environmental regulations have been followed.
38. All erosion control devices and measures shall be constructed, installed, maintained, and removed by the Encroacher in accordance with all applicable Federal, State, and Local laws, regulations, ordinances, and policies. Permanent vegetation shall be established on all disturbed areas in accordance with the recommendations of the Division Roadside Environmental Engineer. All areas disturbed (shoulders, ditches, removed accesses, etc.) shall be graded and seeded in accordance with the latest *NCDOT Standards Specifications for Roads and Structures* and within 15 calendar days with an approved NCDOT seed mixture (all lawn type areas shall be maintained and reseeded as such). Seeding rates per acre shall be applied according to the Division Roadside Environmental Engineer. Any plant or vegetation in the NCDOT planted sites that is destroyed or damaged as a result of this encroachment shall be replaced with plants of like kind or similar shape.
39. **No trees within NCDOT shall be cut without authorization from the Division Roadside Environmental Engineer. An inventory of trees measuring greater than 4 caliper inches (measured 6" above the ground) is required when trees within C/A right of way will be impacted by the encroachment installation. Mitigation is required and will be determined by the Division Roadside Environmental Engineer's Office.**
40. Prior to installation, the Encroaching Party shall contact the District Engineer to discuss any environmental issues associated with the installation to address concerns related to the root system of trees impacted by boring or non-utility construction of sidewalk, roadway widening, etc.

41. The applicant is responsible for identifying project impacts to waters of the United States (wetlands, intermittent streams, perennial streams and ponds) located within the NCDOT right-of-way. The discharge of dredged or fill material into waters of the United States requires authorization from the United States Army Corps of Engineers (USACE) and certification from the North Carolina Division of Water Quality (NCDWQ). The applicant is required to obtain pertinent permits or certification from these regulatory agencies if construction of the project impacts waters of the United States within the NCDOT right-of-way. The applicant is responsible for complying with any river or stream Riparian Buffer Rule as regulated by the NCDWQ. The Rule regulates activity within a 50-foot buffer along perennial streams, intermittent streams and ponds. Additional information can be obtained by contacting the NCDWQ or the USACE.
42. The contractor shall not begin the construction until after the traffic control and erosion control devices have been installed to the satisfaction of the Division Engineer or their agent.
43. The contractor shall perform all monitoring and record keeping and any required maintenance of erosion and sediment control measures to maintain compliance with stormwater regulations.

STIP (or Division Managed) Projects

~~44. State Transportation Improvement Project (STIP) ** XXXXXX is scheduled for future construction. Any encroachment determined to be in conflict with the construction of this NCDOT project shall be removed and/or relocated at the encroaching party's expense.~~

Construction

General

45. An executed copy of the encroachment agreement, provisions and approved plans shall be present at the construction site at all times. If safety or traffic conditions warrant such an action, NCDOT reserves the right to further limit, restrict or suspend operations within the right of way.
46. The Encroaching Party and/or their Contractor shall comply with all OSHA requirements. If OSHA visits the work area associated with this encroachment, the District Office shall be notified by the encroaching party immediately if any violations are cited.
47. Any REVISIONS marked in RED on the attached non-PE sealed plans shall be incorporated into and made part of the approved encroachment agreement.
48. All disturbed areas are to be fully restored to current NCDOT minimum roadway standards or as directed by the Division Engineer or their representative. Disturbed areas within NCDOT Right-of-Way include, but not limited to, any excavation areas, pavement removal, drainage or other features.
49. The encroaching party shall notify the Division Engineer or their representative immediately in the event any drainage structure is blocked, disturbed or damaged. All drainage structures disturbed, damaged or blocked shall be restored to its original condition as directed by the Division Engineer or their representative.
50. VARIANCE GRANTED FOR THIS ENCROACHMENT AGREEMENT: ~~A minimum of 5 feet clearance is required for utility installations beneath or near drainage pipes, headwalls, and a minimum of two-foot clearance below the flowline of streams. If directional drilling, a minimum ten-foot clearance distance is required from drainage structures and a minimum of 5 feet below flowline of streams.~~

51. At points where the utility is placed under existing storm drainage, the trench will be backfilled with excavatable flowable fill up to the outside diameter of the existing pipe.
52. Unless specified otherwise, during non-working hours, equipment shall be located away from the job site or parked as close to the right of way line as possible and be properly barricaded in order not to have any equipment obstruction within the Clear Recovery Area. Also, during non-working hours, no parking or material storage shall be allowed along the shoulders of any state-maintained roadway.
53. No access to the job site, parking or material storage shall be allowed along or from the **Control of Access Roadway.**
54. Guardrail removed or damaged during construction shall be replaced or repaired to its original condition, meeting current NCDOT standards or as directed by the Division Engineer or their representative.
55. The resetting of the Control of Access fence shall be in accordance with the applicable NCDOT standard and as directed by the Division Engineer or their representative.
56. Right of Way monuments disturbed during construction shall be referenced by a registered Land Surveyor and reset after construction.
57. All traffic signs moved during construction shall be reinstalled as soon as possible to the satisfaction of the Division Engineer or their representative.
58. Any utility markers, cabinets, pedestals, meter bases and services for meter reading required shall be as close to the Right of Way line as possible. If it is not feasible to install at or near Right of Way line, then written approval shall be obtained from NCDOT prior to installation.
59. Detection tape, where required by NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act, shall be buried in the trench approximately 1 foot above the installed facility. Where conduit is installed in the right of way and is not of ferrous material, locating tape or detection wire shall be installed with the conduit.
60. All driveways disturbed during construction shall be returned to a state comparable with the condition of the driveways prior to construction.
61. Any proposed driveway connections onto NCDOT roadways will require an approved driveway permit. The approval of this encroachment agreement does not constitute approval of any proposed driveway connections. For further information, contact Mr. Troy L. Baker, Senior Assistant District Engineer at (910) 364-0601.
62. Conformance with driveway permit review should be required in conjunction with this encroachment agreement. In the event there is a conflict between the driveway permit and the encroachment agreement, the District Engineer should resolve the conflict and notify the parties involved.
63. **If the approved method of construction is unsuccessful and other means are required, prior approval must be obtained through the District Engineer before construction may continue.**
64. The encroaching party and their construction contractor must sign and submit the NCDOT *Workforce Safety Plan for Encroachment Activities: COVID-19* form to the District Engineer prior to construction.

Engineering

65. All traffic control, asphalt mixes, structures, construction, workmanship and construction methods, and materials shall be in compliance with the most-recent versions of the following resources: *ASTM Standards*, *Manual on Uniform Traffic Control Devices, NCDOT Utilities Accommodations Manual, NCDOT Standard Specifications for Roads and Structures, NCDOT Roadway Standard Drawings,* NCDOT *Asphalt Quality Management System* manual, **and the approved plans.**
66. Prior approval for any blasting must be obtained from the Division Engineer or their representative.
67. Regulator stations, metering stations, cathodic test stations, and anode beds are not permitted within NCDOT right of way. Header wires are permitted.
68. Non-Utility Communication and Data Transmission installations (ground mounted type or Small Cell pole-mounted type) must adhere to guidelines in the Utilities Accommodations Manual and, when located within municipal jurisdictions, are subject to review and approval by municipal ordinances and any additional municipal approval for proximity to historic districts and landmarks. All wiring and related telecommunications work shall conform to the latest regulations by the Federal Communications Commission.
69. All wiring and related electrical work shall conform to the latest edition of the National Electrical Safety Code.

Location within R/W

70. All utility access points, such as manholes, vaults, handholes, splice boxes and junction boxes shall be located as close to the right of way line as possible and shall not be placed in the ditch line, side slopes of the ditches or in the pavement. All manholes, handholes, splice boxes, junction boxes and vaults and covers shall be flush with the ground when located within the vehicle clear zone. Slack loops for telecommunications in industry standard housing units shall be buried a minimum of 18 inches when buried or meet minimum NCDOT vertical and horizontal clearances when installed aerially.
71. Fire Hydrants shall be of the breakaway type. Hydrants shall be placed near the right of way line. In curb and gutter sections with written approval from the District, the hydrants may be placed at 6' behind the back of the curb or minimum 2’ back of sidewalk.
72. Luminaire and/or utility poles and guy wires shall be set as close to the Right of Way line as practical and outside the Clear Zone in accordance with the latest version of the AASHTO Roadside Design Guide (See corresponding attachment) or made breakaway in accordance with the requirements of NCHRP Report 350. Any relocation of the utility poles from the original design due to Clear Zone requirements shall require a re-submittal for the utility design.
73. Luminaire and/or utility poles shall be set a minimum of 5’-6” behind face of any guardrail or otherwise sufficiently protected. However, standard placement may be reduced to 3’-6” behind face of guardrail when posts are spaced 3’-1 ½”, or where speed limit is less than 55 MPH.

74. Hot box (aka ASSE 1060) or Safe-T-Cover type enclosures covering utility main pipe joints, backflow preventers, valves, vent pipes, cross connections, pumps, grinders, irrigation assemblies, transformers, generators, and other similar large appurtenances shall be located outside sight distance triangles and off of the NCDOT Right-of-Way.

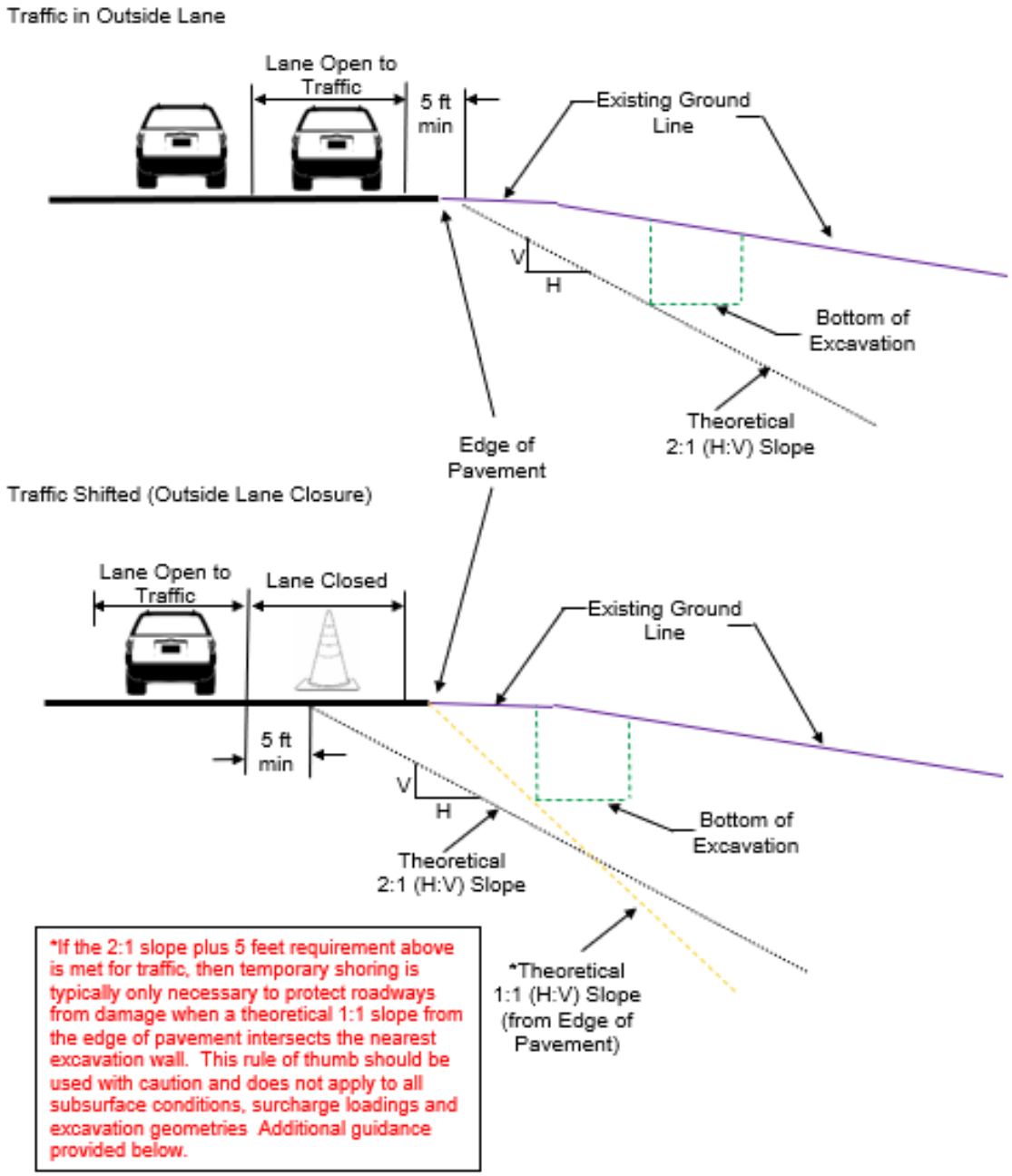
75. Sprinkler heads shall be located a minimum of 10 feet from the edge of pavement, edge of shoulder, or back of curb whichever is greater and shall be directed so that water does not spray or drain on the roadway surface, sidewalk, or passing vehicles at any time. Upon completion of the installation and prior to activation of the system, the Encroacher shall contact the District Engineer to schedule a test of the system to verify the spray pattern. Sprinkler systems shall not be operated during periods of high wind or freezing weather, or to the extent that the subgrade adjacent to the pavement structure becomes saturated. NCDOT reserves the right to require immediate termination and removal of any sprinkler system which in its judgement and opinion adversely affects safety, maintenance, or operation of the roadway.

Excavation

76. Excavation material shall not be placed on pavement.

77. It is the responsibility of the encroaching party or their contractor to prevent any mud/dirt from tracking onto the roadway. Any dirt which may collect on the roadway pavement from equipment and/or truck traffic on site shall be immediately removed to avoid any unsafe traffic conditions.

78. ~~The utility shall be installed within 5 feet of the right of way line and outside the 5-foot minimum from travel lane plus theoretical 2:1 slope from the edge of pavement to the bottom of the nearest excavation wall for temporary shoring. Temporary shoring is required when a theoretical 2:1 slope from the bottom of excavation will intersect the existing ground line less than 5 feet from the outside edge of an open travel lane as shown in the figure below or when a theoretical 2:1 slope from the bottom of excavation will intersect any existing structure, support, utility, property, etc. to be protected.~~



If the 2:1 slope plus 5 feet requirement above is met for traffic, then temporary shoring is typically only necessary to protect roadways from damage when a theoretical 1:1 slope from the edge of pavement intersects the nearest excavation wall. This rule of thumb should be used with caution and does not apply to all subsurface conditions, surcharge loadings and excavation geometries. Situations where this 1:1 slope is not recommended include groundwater depth is above bottom of excavation or excavation is deeper than 10 feet or in Type B or C soils as defined by OSHA Technical Manual. Temporary shoring may be avoided by locating trenches, bore pits, and other excavations far enough away from the open travel lane, edge of pavement and any existing structure, support, utility, property, etc. to be protected.

Temporary shoring shall be designed and constructed in accordance with current NCDOT Standard Temporary Shoring provisions (refer to https://connect.ncdot.gov/resources/Specifications/Pages/2018-Specifications-and-Special-Provisions.aspx and see SP11 R002

a. Temporary excavation shoring, such as sheet piling, shall be installed. The design of the shoring shall include the effects of traffic loads. The shoring system shall be designed and sealed by a licensed North Carolina Professional Engineer. Shoring plans and design calculations shall be submitted to the Division Engineer for review and approval prior to construction. (See NCDOT *Utilities Accommodations Manual* for more information on requirements for shoring plans, design calculations, and subsurface investigation report.) **Trench boxes shall not be accepted as temporary shoring and will not be approved for use in instances where shoring is required to protect the highway, drainage structure, and/or supporting pavement or structure foundation**.

b. All trench excavation inside the limits of the theoretical two-to-one slope plus 5 feet requirement, as defined by the policy, shall be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight. Any excavation that is not backfilled by the end of the workday must address any safety and traveling public concerns including accommodations for bicycles, pedestrians and persons with disabilities.

c. The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled in accordance with Section 300-7 of the latest *NCDOT Standard Specifications for Roads and Structures*, which basically requires the backfill material to be placed in layers not to exceed 6 inches loose and compacted to at least 95% of the density obtained by compacting a sample in accordance with AASHTO T99 as modified by DOT.

d. A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.

e. The length of parallel excavation shall be limited to the length necessary to install and backfill one joint of pipe at a time, not to exceed twenty-five (25) feet.

79. All material to a depth of 8 inches below the finished surface of the subgrade shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade. The option to backfill any trenches with dirt or either #57 stone or #78 stone with consolidation with a plate tamp and without a conventional density test may be pursued with the written consent of the District Engineer. If this option is exercised, then roadway ABC stone and asphalt repair as required will also be specified by the District Engineer.

Directional bore

80. Boring equipment will be provided of a type and size to facilitate boring in the local geologic conditions and shall be able to facilitate the encroachment work.

81. When Horizontal Directional Drilling (HDD) is used, the following stipulations apply:

    a. Use drilling fluids as appropriate for the type soils but use of water alone is prohibited. Pump drilling fluids only while drilling or reaming. Directional boring using jetting with a Bentonite (or equivalent material) slurry is recommended. Monitor flow rates to match the amount leaving the bore hole and do not increase pressure or flow to free stuck drill heads, reamers or piping. Open cutting to retrieve stuck drill heads is not allowed without prior permission from the District Engineer.

    b. The minimum depth shall adhere to the table below for transverse (under non-controlled access, partial controlled access, or limited controlled access roadway) installations and refers to maximum diameter of hole drilled and not the dimension of the carrier or encasement pipe.

Diameter of Drilled Hole (Backream)	Minimum Depth of Cover
2" to 6”	5 feet
>6” to 15”	12 times hole diameter (e.g. 6-inch hole means 6 feet minimum depth)
>15” to 36”	15 feet or greater

    c. Under fully controlled access roadway installations, the minimum depth for transverse crossings shall be 15 feet under any pavement (ramps or thru lanes)

    d. An overbore (backream diameter) shall not be more than 1.5 times the outside diameter of the pipe or encasement under any highway for pipes 12 inches in diameter or less. For pipes with outer diameter larger than 12 inches, the overbore may be no larger than outer diameter of pipe plus 6 inches. An overbore exceeding 1.5 times greater than the outside diameter of the pipe or encasement may be considered if the encroachment agreement includes a statement signed and sealed by a licensed North Carolina Professional Engineer indicating that an overbore in excess of 1.5 times the outside diameter of the pipe or encasement will appropriately arch and no damage will be done to the pavement or sub-grade.

    e. Directional boring is allowed beneath embankment material in naturally occurring soil.

    f. Any parallel installation utilizing the directional boring method shall be made at a minimum depth of three (3’) feet (cover) below the ground surface and outside the theoretical 1:1 slope from the existing edge of pavement except where the parallel installation crosses a paved roadway.

g. All directional bores shall maintain ten (10) feet minimum (clear) distance from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts or box culverts. Directional bores are not allowed beneath bridge footings, culvert wingwall footings, slope protection or retaining walls.
h. The tip of the drill string shall have a cutter head.
i. Detection wire shall be installed with non-ferrous material.
j. HDPE pipe installed by directional boring shall not be connected to existing pipe or fittings for one (1) week from the time of installation to allow tensional stresses to relax.

Aerial clearances

82. Vertical clearance of overhead power and communication lines shall meet the National Electrical Safety Code requirements except the minimum vertical clearance shall be 18' for crossings over NCDOT roadways (24' over Fully Controlled Access roadways) and 16' for parallel installations.

83. In relation to the bridge, the utility line shall be located with minimum clearances as indicated on the attachment for NCDOT **Required Clearances for Aerial Installations by Encroachment Near Bridge Structures**.

Pavement Detail and Repair

84. The paving of this roadway shall be in accordance with the latest version of the NCDOT Standard Specifications, Sections 610, 1012 and 1020. The Contractor shall follow all procedures of the Quality Management System (QMS) for asphalt pavement - Maintenance Version (see https://connect.ncdot.gov/resources/Materials/MaterialsResources/2018%20QMS%20Asphalt%20Manual.pdf). The Contractor must adhere to all testing requirements and quality control requirements specified. The Contractor shall contact the NCDOT Division QA Supervisor prior to producing plant mix and make the Supervisor aware that the mix is being produced for a future NCDOT road. Contact the District Engineer to determine the NCDOT Division QA Supervisor. Only NCDOT approved mix designs will be acceptable. A Quality Control Plan shall be submitted (as Directed by the District Engineer) to the District Engineer's Office prior to asphalt production utilizing form QMS-MV1. Failing mixes and/or densities are subject to penalties including monetary payments or removal and replacement. To minimize traffic queuing in construction areas, the possibility of traffic detours may be considered when working on high traffic routes even if traffic control is used. The District Engineer may require traffic detours.

85. When paving beyond utility installation is involved or as directed by the Engineer, a Roadway certification report sealed by a Professional Engineer shall be submitted to the District Engineer's office indicating the following:

- **Pavement thickness by type**
- **Pavement density, core and/or test locations**
- **Base thickness**
- **Base density**
- **Subgrade density**

Test frequency and method shall be in conformance with the NCDOT *Materials and Tests Manual*. Test must be performed by a Certified Technician including name and Certification number on report.

86. "Potholing" pavement cores to expose existing utilities shall be made with an 18" diameter keyhole pavement core. Pavement core locations shall not be placed in the wheel path whenever possible. Vacuum excavation shall be utilized to expose underground utilities. Pavement cores shall be repaired within the same working day. The pavement core shall be retained and reused to fill the core hole.

    The excavation shall be backfilled and compacted with select material to the bottom of the existing pavement structure or as indicated by the District Engineer. The retained core shall be placed in the hole and secured with a waterproof, mechanical joint. If the pavement core is damaged and cannot be re-used, the core may be replaced with the surface mix, S9.5B. The asphalt patch shall match the thickness of the existing asphalt or four inches, whichever is greater. All materials must be listed on the NCDOT Approved Products List (APL) found at: https://apps.ncdot.gov/vendor/approvedproducts/.

~~87. All open cuts (if permitted) on primary routes will require full depth patching with 5.0" of B 25.0 B (ACBC) Asphalt Concrete Base Course, 3.0" of I 19.0 B (ACIC) Asphalt Concrete Intermediate Course and 2.0" of S 9.5 B (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 2.0" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.~~

88. All open cuts (if permitted) on secondary routes will require full depth patching with 4.0" of B 25.0 C (ACBC) Asphalt Concrete Base Course and 3.0" of S 9.5 C (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 1.5" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.

89. Eight inches of ABC will be used as the base. Compaction test shall be performed at the location of every open cut that crosses NCDOT roadways. The owner will be required to have an approved laboratory furnish the District Office a copy of the test results.

90. The encroaching party will be required to mill at a depth of 0" – 1.5" for a distance of twenty-five feet (25') at the beginning and twenty-five feet (25') at the end of the project (each side of the required overlay) to allow for a smooth transition with the existing pavement as shown on the attached plans.

91. Pavement cuts shall be repaired the same day the cuts are made unless an asphalt patch cannot be accomplished the same day due to material availability or time restrictions. When the asphalt patch is not feasible, the following apply:
    a. The pavement cut shall be filled to the surface with ABC stone or Flowable Fill per NCDOT's Standards and Specifications.
    b. Once the cut is filled, a minimum ¾-inch steel plate shall be placed and pinned to prevent moving. Plates shall be designed large enough to span a minimum of 1-foot on all sides on the pavement cut.
    c. When flowable fill is used, it shall cure for 24 hours prior to any asphalt material placement. Flowable fill bleed water shall not be present during paving operations. Paving shall not cause damage (shoving, distortion, pumping, etc.) to the flowable fill.
    d. Install and leave "BUMP" signs according to MUTCD until the steel plate has been removed. Once the flowable fill has cured, remove the steel plate, and mill/fill according to the directions of the District Engineer.
    e. All pavement cuts must be sealed with NCDOT approved sealant to prevent future pavement separation or cracking.

92. **Any pavement damaged because of settlement of the pavement or damaged by equipment used to perform encroachment work, shall be re-surfaced to the satisfaction of the District Engineer. This may include the removal of pavement and a 50' mechanical overlay. All pavement work and pavement markings (temporary and final) are the responsibility of the Encroaching Party.**

93. All concrete installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

94. All concrete sidewalk installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01 and 848.01) and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

95. All ADA compliant curb ramps shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 848.06) and Amendments or Supplementals thereto including but not limited to the Alternate Curb Ramp Designs (Curb Ramp Details - Parallel Ramps). All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

96. All 30" curb and gutter within NCDOT rights of way shall be constructed with Class B concrete in accordance with Section 846 of the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01) and Amendment or Supplemental thereto or as directed by the engineer. All concrete testing results shall be provided to the District Engineer's office at time of project completion.

Post Construction

Close out/ Inspection

97. The Encroaching party shall notify the District Engineer's office within 2 business days after construction is complete. The District Engineer may perform a construction inspection. Any deficiencies may be noted and reported to the encroaching party to make immediate repairs or resolve any issues to restore the right-of-way to a similar condition prior to construction, including pavement, signage, traffic signals, pavement markings, drainage, structures/pipes, or other highway design features.

98. At the discretion of the District Engineer, a final inspection report may be provided to the encroaching party upon satisfactory completion of the work.

99. A written acknowledgement of the completed work by the District Engineer's office begins the one-year warranty period associated with the performance bond.

100. A copy of the "as-built" plan shall be submitted to the District Engineer's office in a PDF format and in a current ESRI GIS format within 4 weeks of construction along with an executed Certification Memo shall be submitted to the District Office (online encroachment database). The As-Built drawing(s) shall depict the horizontal and vertical locations of all utilities and associated appurtenances.

101. A copy (in PDF format) of the completed ground water analysis shall be given to the District Engineer, including detailed drawings of the "as-built" wells showing location, depth and water level in well.

If further information or assistance is needed in reference to this project, please feel free to call Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer at (910) 364-0601.

Sincerely,

DocuSigned by:
Greg W. Burns
C2649BD929294B9...

DS
TLB

Greg W. Burns, PE
Division Engineer

GWB:tlb

cc: https://connect.ncdot.gov/site/Permits/Pages/All-Submissions.aspx

B.7
NCDOT Encroachment E062-026-20-00170
(Camden Road)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

January 25, 2021

Mr. David W. Trego, CEO/General Manager
Public Works Commission
ATTN: Mrs. Misty Manning, PE, Water Resources Engineering Manager
Post Office Box 1089
Fayetteville, NC 28302

SUBJECT: Encroachment Agreement on SR 1003 (Camden Road) in Cumberland County (E062-026-20-00170).

Dear Sir:

Attached is an approved R/W form 16.1 and plans for the installation of 70'± of 24"Φ ductile iron (DI) sanitary sewer main encased in 70'± of 36"Φ steel by bore and jack method with associated appurtenances on SR 1003 (Camden Road) as associated with the Big Rockfish Creek Outfall project in Cumberland County as shown on the attached plans (PWC encroachment #18845 – AS 15313AAA).

Location:

Route	At a point	Towards
SR 1003	304'± southwest of the intersection of SR 1003 (Camden Road) and SR 4163 (Northbank Street)	70'± to the northwest

This encroachment is approved subject to the following:

Pre-Construction

Contact Offices & Outside Agency issues/contacts/info

1. Approval may be rescinded upon failure to follow any of the provisions in this permit and may be considered a violation of the encroachment agreement.
2. The Encroaching party or their contractor shall provide the following notices prior to construction activity within the NCDOT Right of Way:
   a. Three (3) business days advance phone call Mr. Troy Baker, Senior Assistant District Engineer at telephone (910) 364-0601 or email to tlbaker@ncdot.gov to the District Engineer's office.

   Failure to provide these notifications prior to beginning construction is subject to the Division Engineer's discretion to cease construction activity for this encroachment. NCDOT reserves the right to cease any construction or maintenance work associated with this installation by the encroaching party until the construction or maintenance meets the satisfaction of the Division Engineer or their representative.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
DIVISION SIX / DISTRICT TWO
POST OFFICE BOX 1150
FAYETTEVILLE, NC 28302

Telephone: (910) 364-0601
Fax: (910) 437-2529
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
600 SOUTHERN AVENUE
FAYETTEVILLE, NC 28306

3. **The encroaching party's construction contractor must submit the NCDOT Workforce Safety Plan for Encroachment Activities: COVID-19 form to the District Engineer prior to construction. Construction within nor access to the right of way shall not commence until such time as the required Workplace Safety plans has been submitted to the District office.**
4. Prior to beginning work, it is the requirement of the Encroaching Party to contact the appropriate Utility Companies involved and make arrangements to adjust or relocate any utilities that conflict with the proposed work.
5. It shall be the responsibility of the encroaching party to determine the location of utilities within the encroachment area. NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act requires underground utilities to be located by calling 811 prior to construction. The encroaching party shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruption to existing facilities and maintain access to them.
6. The encroaching party shall notify the appropriate municipal office prior to beginning any work within the municipality's limits of jurisdiction.
7. Excavation within 1000 feet of a signalized intersection will require notification by the encroaching party to the Division Traffic Engineer at telephone number (910) 364-0606 no less than one week prior to beginning work. All traffic signal or detection cables must be located prior to excavation. Cost to replace or repair NCDOT signs, signals, pavement markings or associated equipment and facilities shall be the responsibility of the encroaching party.
8. This agreement does not authorize installations within nor encroachment onto railroad rights of way. Permits for installations within railroad right of way must be obtained from the railroad and are the responsibility of the encroaching party.
9. At the option of the District Engineer, a preconstruction meeting including representatives of NCDOT, the encroaching party, contractors and municipality, if applicable, shall be required. A pre-construction conference held between a municipality (or other facility owner) and a contractor without the presence of NCDOT personnel with subsequent construction commencing may be subject to NCDOT personnel ceasing any work on NCDOT right-of-way related to this encroachment until such meeting is held. Contact the District office to schedule.
10. At the discretion of the District Engineer, a NOTIFICATION FOR UTILITY / NON-UTILITY ENCROACHMENT WITHIN NCDOT R/W form (See corresponding attachment) with the scheduled pre-construction meeting and associated construction schedule details must be completed and submitted to the District Engineer's office a minimum of one week prior to construction.
11. **A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.**

Legal & Right-of-Way Issues

12. This approval and associated plans and supporting documents shall not be interpreted to allow any design change or change in the intent of the design by the Owner, Design Engineer, or any of their representatives. Any revisions or changes to these approved plans or intent for construction must be obtained in writing from the Division Engineer's office or their representative prior to construction or during construction, if an issue arises during construction to warrant changes.
13. NCDOT does not guarantee the right of way on this road, nor will it be responsible for any claim for damages brought about by any property owner by reason of this installation. It is the responsibility of the encroaching party to verify the right of way.
14. Prior to the approval of any privately maintained facility within NCDOT right of way which the State of North Carolina is not the fee simple owner, written permission that each and every property owner affected by the installation shall be provided to NCDOT by the encroaching party. (See corresponding attachment.)
15. Encroaching party shall be responsible for obtaining all necessary permanent and/or temporary construction, drainage, utility and/or sight distance easements.
16. All Right of Way and easements necessary for construction and maintenance shall be dedicated to NCDOT with proof of dedication furnished to the District Engineer prior to beginning work.
17. No commercial advertising shall be allowed within NCDOT Right of Way.
18. The encroaching party shall obtain proper approval from all affected pole owners prior to attachment to any pole.
19. The installation within the Control of Access fence shall not adversely affect the design, construction, maintenance, stability, traffic safety or operation of the controlled access highway, and the utility must be serviced without access from the through-traffic roadways or ramps.

Bonds

20. A Performance and Indemnity Bond in the amount of $0.00 shall be posted with the District Engineer's Office by the Party of the Second Part prior to beginning any work within the NCDOT Right of Way. The bond shall be held for a minimum of one year after a satisfactory final inspection of the installation by NCDOT. The bond may be held for a period longer than one year after completion if, in the opinion of NCDOT, the size or complexity of the installation warrants a longer period.
21. The release of the bond is subject to a final inspection by NCDOT. Contact the District office to schedule a Final Inspection and to request release of the bond.

Work Zone Traffic

22. Traffic control shall be coordinated with the District Engineer and the Division Traffic Engineer, Mr. Frank West at telephone (910) 364-0606, prior to construction.

23. WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

    All personnel performing any activity inside the highway right of way are required to be familiar with the NCDOT Maintenance / Utility Traffic Control Guidelines (MUTCG). No specific training course or test is required for qualification in the Maintenance /Utility Traffic Control Guidelines (MUTCG).

    All flagging, spotting, or operating Automated Flagger Assist Devices (AFAD) inside the highway right of way requires qualified and trained Work Zone Flaggers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel involved with the installation of Work Zone Traffic Control devices inside the highway right of way are required to be qualified and trained Work Zone Installers. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    All personnel in charge of overseeing work zone Temporary Traffic Control operations and installations inside the highway right of way are required to be qualified and trained Work Zone Supervisors. Training for this certification is provided by NCDOT approved training resources and by private entities that have been pre-approved to train themselves.

    For questions and/or additional information regarding this training program please refer to https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx or call the NCDOT Work Zone Traffic Control Section (919) 814-5000.

24. The party of the second part shall employ traffic control measures that are in accordance with the prevailing federal, state, local, and NCDOT policies, standards, and procedures. These policies, standards, and procedures include, but are not limited to the following:
    a. Manual on Uniform Traffic Control Devices (MUTCD) – North Carolina has adopted the MUTCD to provide basic principles and guidelines for traffic control device design, application, installation, and maintenance. North Carolina uses the MUTCD as a minimum requirement where higher supplemental standards specific to North Carolina are not established. Use fundamental principles and best practices of MUTCD (Part 6, Temporary Traffic Control).
    b. NCDOT Maintenance / Utility Traffic Control Guidelines – This document enhances the fundamental principles and best practices established in MUTCD Part 6, Temporary Traffic Control, incorporating NCDOT-specific standards and details. It also covers important safety knowledge for a wide range of work zone job responsibilities.

25. If the Traffic Control Supervisor determines that portable concrete barrier (PCB) is required to shield a hazard within the clear zone, then PCB shall be designed and sealed by a licensed North Carolina Professional Engineer. PCB plans and design calculations shall be submitted to the District Engineer for review and approval prior to installation.

26. Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to police, EMS and fire stations, fire hydrants, secondary schools, and hospitals.

27. Traffic shall be maintained at all times. All lanes of traffic are to be open during the hours of 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Monday through Friday, during any time of inclement weather, **or as directed by the District Engineer**. No lane of traffic shall be closed on holidays, special events, or as directed by the engineer. Any violation of these hours will result in ceasing any further construction by the Encroaching Party or their contractor.
28. Nighttime and weekend operations will NOT be allowed unless written approval is received from the District Engineer. If nighttime or weekend work is allowed or required, all signs must be retro-reflective, and a work zone lighting plan must be submitted for approval prior to construction.
29. Two-way traffic shall be maintained at all times unless designated by the District Engineer. Traffic shall not be rerouted or detoured without the prior written approval from the District Engineer. No utility work will be allowed on state holidays from 7:00 PM the night before through 9:00 AM the day prior to, following or during local events without prior approval from the District Engineer. If the construction is within 1000 feet of a school location or on a designated bus route, the construction shall be coordinated with the school start and end times to avoid traffic delays.
30. Work requiring lane or shoulder closures shall not be performed on both sides of the road simultaneously within the same area.
31. Any work requiring equipment or personnel within 5 feet of the edge of any travel lane of an undivided facility and within 10 feet of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers per current *NCDOT Roadway Standard Drawings or MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES*.
32. At the discretion of the District Engineer, a traffic control plan shall be developed and submitted under the seal and signature of a Licensed North Carolina Professional Engineer prior to construction. The plan shall be specific to the site and adequately detailed. Issues such as the close proximity to intersections shall be addressed.
33. Temporary and final pavement markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted with the encroachment request to the Division Traffic Engineer prior to construction. Final pavement markings shall be thermoplastic unless otherwise directed by the Division Traffic Engineer or District Engineer.
34. Any pavement markings that are damaged or obliterated shall be restored by the encroaching party at no expense to NCDOT.
35. Sidewalk closures shall be installed as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with The American with Disabilities Act Accessibility Guidelines. The encroaching party must adhere to the guidelines for accommodating pedestrians in encroachment work zones as described in the NCDOT Pedestrian Work Zone Accommodations Training found at https://www.youtube.com/watch?v=AOuYa5IW3dg&feature=youtu.be

Roadside Environmental

36. The encroaching party shall comply with all applicable Federal, State and local environmental regulations and shall obtain all necessary Federal, State and local environmental permits, including but not limited to, those related to sediment control, stormwater, wetland, streams, endangered species and historical sites. Additional information can be obtained by contacting the NCDOT Roadside Environmental Engineer regarding the North Carolina Natural Heritage Program or the United States Fish and Wildlife Services. Contact the Division Roadside Environmental Engineer's Office at (910) 364-0603.
37. When surface area in excess of one acre will be disturbed, the Encroacher shall submit a Sediment and Erosion Control Plan which has been approved by the appropriate regulatory agency or authority prior to beginning any work on the Right of Way. Failure to provide this information shall be grounds for suspension of operations. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with the approved sediment and erosion control plan.
38. The Verification of Compliance with Environmental Regulations (VCER-1) form is required for all non-utility encroachment agreements or any utility encroachments when land disturbance within NCDOT right of way exceeds 1 acre. The VCER-1 form must be PE sealed by a NC registered professional engineer who has verified that all appropriate environmental permits (if applicable) have been obtained and all applicable environmental regulations have been followed.
39. All erosion control devices and measures shall be constructed, installed, maintained, and removed by the Encroacher in accordance with all applicable Federal, State, and Local laws, regulations, ordinances, and policies. Permanent vegetation shall be established on all disturbed areas in accordance with the recommendations of the Division Roadside Environmental Engineer. All areas disturbed (shoulders, ditches, removed accesses, etc.) shall be graded and seeded in accordance with the latest *NCDOT Standards Specifications for Roads and Structures* and within 15 calendar days with an approved NCDOT seed mixture (all lawn type areas shall be maintained and reseeded as such). Seeding rates per acre shall be applied according to the Division Roadside Environmental Engineer. Any plant or vegetation in the NCDOT planted sites that is destroyed or damaged as a result of this encroachment shall be replaced with plants of like kind or similar shape.
40. **No trees within NCDOT shall be cut without authorization from the Division Roadside Environmental Engineer. An inventory of trees measuring greater than 4 caliper inches (measured 6" above the ground) is required when trees within C/A right of way will be impacted by the encroachment installation. Mitigation is required and will be determined by the Division Roadside Environmental Engineer's Office.**
41. Prior to installation, the Encroaching Party shall contact the District Engineer to discuss any environmental issues associated with the installation to address concerns related to the root system of trees impacted by boring or non-utility construction of sidewalk, roadway widening, etc.

42. The applicant is responsible for identifying project impacts to waters of the United States (wetlands, intermittent streams, perennial streams and ponds) located within the NCDOT right-of-way. The discharge of dredged or fill material into waters of the United States requires authorization from the United States Army Corps of Engineers (USACE) and certification from the North Carolina Division of Water Quality (NCDWQ). The applicant is required to obtain pertinent permits or certification from these regulatory agencies if construction of the project impacts waters of the United States within the NCDOT right-of-way. The applicant is responsible for complying with any river or stream Riparian Buffer Rule as regulated by the NCDWQ. The Rule regulates activity within a 50-foot buffer along perennial streams, intermittent streams and ponds. Additional information can be obtained by contacting the NCDWQ or the USACE.
43. The contractor shall not begin the construction until after the traffic control and erosion control devices have been installed to the satisfaction of the Division Engineer or their agent.
44. The contractor shall perform all monitoring and record keeping and any required maintenance of erosion and sediment control measures to maintain compliance with stormwater regulations.

STIP (or Division Managed) Projects

45. **State Transportation Improvement Project (STIP) U-6051B is scheduled for future construction. Any encroachment determined to be in conflict with the construction of this NCDOT project shall be removed and/or relocated at the encroaching party's expense**

Construction

General

46. An executed copy of the encroachment agreement, provisions and approved plans shall be present at the construction site at all times. If safety or traffic conditions warrant such an action, NCDOT reserves the right to further limit, restrict or suspend operations within the right of way.
47. The Encroaching Party and/or their Contractor shall comply with all OSHA requirements. If OSHA visits the work area associated with this encroachment, the District Office shall be notified by the encroaching party immediately if any violations are cited.
48. Any REVISIONS marked in RED on the attached non-PE sealed plans shall be incorporated into and made part of the approved encroachment agreement.
49. All disturbed areas are to be fully restored to current NCDOT minimum roadway standards or as directed by the Division Engineer or their representative. Disturbed areas within NCDOT Right-of-Way include, but not limited to, any excavation areas, pavement removal, drainage or other features.
50. The encroaching party shall notify the Division Engineer or their representative immediately in the event any drainage structure is blocked, disturbed or damaged. All drainage structures disturbed, damaged or blocked shall be restored to its original condition as directed by the Division Engineer or their representative.
51. A minimum of 5 feet clearance is required for utility installations beneath or near drainage pipes, headwalls, and a minimum of two-foot clearance below the flowline of streams. If directional drilling, a minimum ten-foot clearance distance is required from drainage structures and a minimum of 5 feet below flowline of streams.

52. At points where the utility is placed under existing storm drainage, the trench will be backfilled with excavatable flowable fill up to the outside diameter of the existing pipe.
53. Unless specified otherwise, during non-working hours, equipment shall be located away from the job site or parked as close to the right of way line as possible and be properly barricaded in order not to have any equipment obstruction within the Clear Recovery Area. Also, during non-working hours, no parking or material storage shall be allowed along the shoulders of any state-maintained roadway.
54. No access to the job site, parking or material storage shall be allowed along or from the **Control of Access Roadway.**
55. Guardrail removed or damaged during construction shall be replaced or repaired to its original condition, meeting current NCDOT standards or as directed by the Division Engineer or their representative.
56. The resetting of the Control of Access fence shall be in accordance with the applicable NCDOT standard and as directed by the Division Engineer or their representative.
57. Right of Way monuments disturbed during construction shall be referenced by a registered Land Surveyor and reset after construction.
58. All traffic signs moved during construction shall be reinstalled as soon as possible to the satisfaction of the Division Engineer or their representative.
59. Any utility markers, cabinets, pedestals, meter bases and services for meter reading required shall be as close to the Right of Way line as possible. If it is not feasible to install at or near Right of Way line, then written approval shall be obtained from NCDOT prior to installation.
60. Detection tape, where required by NCGS § 87-115 through § 87-130 of the Underground Utility Safety and Damage Prevention Act, shall be buried in the trench approximately 1 foot above the installed facility. Where conduit is installed in the right of way and is not of ferrous material, locating tape or detection wire shall be installed with the conduit.
61. All driveways disturbed during construction shall be returned to a state comparable with the condition of the driveways prior to construction.
62. Any proposed driveway connections onto NCDOT roadways will require an approved driveway permit. The approval of this encroachment agreement does not constitute approval of any proposed driveway connections. For further information, contact Mr. Troy L. Baker, Senior Assistant District Engineer at (910) 364-0601.
63. Conformance with driveway permit review should be required in conjunction with this encroachment agreement. In the event there is a conflict between the driveway permit and the encroachment agreement, the District Engineer should resolve the conflict and notify the parties involved.
64. **If the approved method of construction is unsuccessful and other means are required, prior approval must be obtained through the District Engineer before construction may continue.**

Engineering

65. All traffic control, asphalt mixes, structures, construction, workmanship and construction methods, and materials shall be in compliance with the most-recent versions of the following resources: *ASTM Standards*, *Manual on Uniform Traffic Control Devices, NCDOT Utilities Accommodations Manual, NCDOT Standard Specifications for Roads and Structures, NCDOT Roadway Standard Drawings,* NCDOT *Asphalt Quality Management System* manual, **and the approved plans.**
66. Prior approval for any blasting must be obtained from the Division Engineer or their representative.
67. Regulator stations, metering stations, cathodic test stations, and anode beds are not permitted within NCDOT right of way. Header wires are permitted.
68. Non-Utility Communication and Data Transmission installations (ground mounted type or Small Cell pole-mounted type) must adhere to guidelines in the Utilities Accommodations Manual and, when located within municipal jurisdictions, are subject to review and approval by municipal ordinances and any additional municipal approval for proximity to historic districts and landmarks. All wiring and related telecommunications work shall conform to the latest regulations by the Federal Communications Commission.
69. All wiring and related electrical work shall conform to the latest edition of the National Electrical Safety Code.

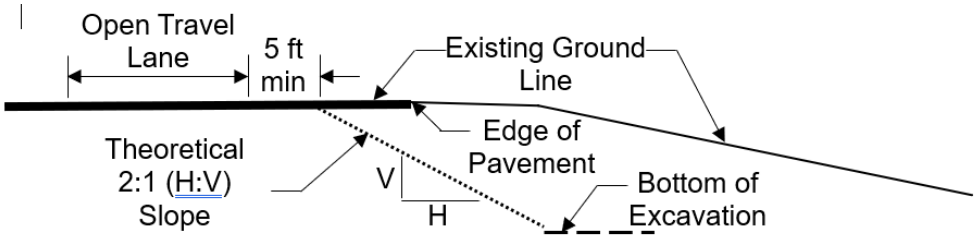
Location within R/W

70. All utility access points, such as manholes, vaults, handholes, splice boxes and junction boxes shall be located as close to the right of way line as possible and shall not be placed in the ditch line, side slopes of the ditches or in the pavement. All manholes, handholes, splice boxes, junction boxes and vaults and covers shall be flush with the ground when located within the vehicle clear zone. Slack loops for telecommunications in industry standard housing units shall be buried a minimum of 18 inches when buried or meet minimum NCDOT vertical and horizontal clearances when installed aerially.
71. Fire Hydrants shall be of the breakaway type. Hydrants shall be placed near the right of way line. In curb and gutter sections with written approval from the District, the hydrants may be placed at 6' behind the back of the curb or minimum 2’ back of sidewalk.
72. Luminaire and/or utility poles and guy wires shall be set as close to the Right of Way line as practical and outside the Clear Zone in accordance with the latest version of the AASHTO Roadside Design Guide (See corresponding attachment) or made breakaway in accordance with the requirements of NCHRP Report 350. Any relocation of the utility poles from the original design due to Clear Zone requirements shall require a re-submittal for the utility design.
73. Luminaire and/or utility poles shall be set a minimum of 5’-6” behind face of any guardrail or otherwise sufficiently protected. However, standard placement may be reduced to 3’-6” behind face of guardrail when posts are spaced 3’-1 ½”, or where speed limit is less than 55 MPH.

74. Hot box (aka ASSE 1060) or Safe-T-Cover type enclosures covering utility main pipe joints, backflow preventers, valves, vent pipes, cross connections, pumps, grinders, irrigation assemblies, transformers, generators, and other similar large appurtenances shall be located outside sight distance triangles and off of the NCDOT Right-of-Way.
75. Sprinkler heads shall be located a minimum of 10 feet from the edge of pavement, edge of shoulder, or back of curb whichever is greater and shall be directed so that water does not spray or drain on the roadway surface, sidewalk, or passing vehicles at any time. Upon completion of the installation and prior to activation of the system, the Encroacher shall contact the District Engineer to schedule a test of the system to verify the spray pattern. Sprinkler systems shall not be operated during periods of high wind or freezing weather, or to the extent that the subgrade adjacent to the pavement structure becomes saturated. NCDOT reserves the right to require immediate termination and removal of any sprinkler system which in its judgement and opinion adversely affects safety, maintenance, or operation of the roadway.

Excavation

76. Excavation material shall not be placed on pavement.
77. It is the responsibility of the encroaching party or their contractor to prevent any mud/dirt from tracking onto the roadway. Any dirt which may collect on the roadway pavement from equipment and/or truck traffic on site shall be immediately removed to avoid any unsafe traffic conditions.
78. Excavated areas adjacent to pavement having more than a 2" drop shall be safed up at a 6:1 or flatter slope and designated by appropriate delineation during periods of inactivity, including, but not limited to, night and weekend hours. Excavated material shall not be placed on the roadway at any time.
79. The utility shall be installed within 5 feet of the right of way line and outside the 5-foot minimum from travel lane plus theoretical 2:1 slope from the edge of pavement to the bottom of the nearest excavation wall for temporary shoring. If the 2:1 slope plus 5 feet requirement above is met for traffic, then temporary shoring is typically only necessary to protect roadways from damage when a theoretical 1:1 slope from the edge of pavement intersects the nearest excavation wall. This rule of thumb should be used with caution and does not apply to all subsurface conditions, surcharge loadings and excavation geometries. Situations where this 1:1 slope is not recommended include groundwater depth is above bottom of excavation or excavation is deeper than 10 feet or in Type B or C soils as defined by OSHA Technical Manual. Temporary shoring may be avoided by locating trenches, bore pits, and other excavations far enough away from the open travel lane, edge of pavement and any existing structure, support, utility, property, etc. to be protected. Temporary shoring is required when a theoretical 2:1 slope from the bottom of excavation will intersect the existing ground line less than 5 feet from the outside edge of an open travel lane as shown in the figure below or when a theoretical 2:1 slope from the bottom of excavation will intersect any existing structure, support, utility, property, etc. to be protected.



Temporary shoring shall be designed and constructed in accordance with current NCDOT Standard Temporary Shoring provisions (refer to https://connect.ncdot.gov/resources/Specifications/Pages/2018-Specifications-and-Special-Provisions.aspx and see SP11 R002).

a. Temporary excavation shoring, such as sheet piling, shall be installed. The design of the shoring shall include the effects of traffic loads. The shoring system shall be designed and sealed by a licensed North Carolina Professional Engineer. Shoring plans and design calculations shall be submitted to the Division Engineer for review and approval prior to construction. (See NCDOT *Utilities Accommodations Manual* for more information on requirements for shoring plans and design calculations.) **Trench boxes shall not be accepted as temporary shoring and will not be approved for use in instances where shoring is required to protect the highway, drainage structure, and/or supporting pavement or structure foundation**.

b. All trench excavation inside the limits of the theoretical one-to-one slope, as defined by the policy, shall be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight. Any excavation that is not backfilled by the end of the workday must address any safety and traveling public concerns including accommodations for bicycles, pedestrians and persons with disabilities.

c. The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled in accordance with Section 300-7 of the latest *NCDOT Standard Specifications for Roads and Structures*, which basically requires the backfill material to be placed in layers not to exceed 6 inches loose and compacted to at least 95% of the density obtained by compacting a sample in accordance with AASHTO T99 as modified by DOT.

d. A qualified NCDOT inspector shall be on the site at all times during construction. The encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a licensed North Carolina Professional Engineer, on the site at all times. The Professional Registered Engineer shall certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.

e. The length of parallel excavation shall be limited to the length necessary to install and backfill one joint of pipe at a time, not to exceed twenty-five (25) feet.

80. All material to a depth of 8 inches below the finished surface of the subgrade shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the Department. The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade. The option to backfill any trenches with dirt or either #57 stone or #78 stone with consolidation with a plate tamp and without a conventional density test may be pursued with the written consent of the District Engineer. If this option is exercised, then roadway ABC stone and asphalt repair as required will also be specified by the District Engineer.

Directional bore

81. Boring equipment will be provided of a type and size to facilitate boring in the local geologic conditions and shall be able to facilitate the encroachment work.

82. When Horizontal Directional Drilling (HDD) is used, the following stipulations apply:
    a. Use drilling fluids as appropriate for the type soils but use of water alone is prohibited. Pump drilling fluids only while drilling or reaming. Directional boring using jetting with a Bentonite (or equivalent material) slurry is recommended. Monitor flow rates to match the amount leaving the bore hole and do not increase pressure or flow to free stuck drill heads, reamers or piping. Open cutting to retrieve stuck drill heads is not allowed without prior permission from the District Engineer.
    b. The minimum depth shall adhere to the table below for transverse (under non-controlled access, partial controlled access, or limited controlled access roadway) installations and refers to maximum diameter of hole drilled and not the dimension of the carrier or encasement pipe.

Diameter of Drilled Hole (Backream)	Minimum Depth of Cover
2" to 6”	5 feet
>6” to 15”	12 times hole diameter (e.g. 6-inch hole means 6 feet minimum depth)
>15” to 36”	15 feet or greater

    c. Under fully controlled access roadway installations, the minimum depth for transverse crossings shall be 15 feet under any pavement (ramps or thru lanes)
    d. An overbore (backream diameter) shall not be more than 1.5 times the outside diameter of the pipe or encasement under any highway for pipes 12 inches in diameter or less. For pipes with outer diameter larger than 12 inches, the overbore may be no larger than outer diameter of pipe plus 6 inches. An overbore exceeding 1.5 times greater than the outside diameter of the pipe or encasement may be considered if the encroachment agreement includes a statement signed and sealed by a licensed North Carolina Professional Engineer indicating that an overbore in excess of 1.5 times the outside diameter of the pipe or encasement will appropriately arch and no damage will be done to the pavement or sub-grade.
    e. Directional boring is allowed beneath embankment material in naturally occurring soil.

f. Any parallel installation utilizing the directional boring method shall be made at a minimum depth of three (3') feet (cover) below the ground surface and outside the theoretical 1:1 slope from the existing edge of pavement except where the parallel installation crosses a paved roadway.
g. All directional bores shall maintain ten (10) feet minimum (clear) distance from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts or box culverts. Directional bores are not allowed beneath bridge footings, culvert wingwall footings, slope protection or retaining walls.
h. The tip of the drill string shall have a cutter head.
i. Detection wire shall be installed with non-ferrous material.
j. HDPE pipe installed by directional boring shall not be connected to existing pipe or fittings for one (1) week from the time of installation to allow tensional stresses to relax.

Aerial clearances

83. Vertical clearance of overhead power and communication lines shall meet the National Electrical Safety Code requirements except the minimum vertical clearance shall be 18' for crossings over NCDOT roadways (24' over Fully Controlled Access roadways) and 16' for parallel installations.
84. In relation to the bridge, the utility line shall be located with minimum clearances as indicated on the attachment for NCDOT **Required Clearances for Aerial Installations by Encroachment Near Bridge Structures**.

Pavement Detail and Repair

85. The paving of this roadway shall be in accordance with the latest version of the NCDOT Standard Specifications, Sections 610, 1012 and 1020. The Contractor shall follow all procedures of the Quality Management System (QMS) for asphalt pavement - Maintenance Version (see https://connect.ncdot.gov/resources/Materials/MaterialsResources/2018%20QMS%20Asphalt%20Manual.pdf). The Contractor must adhere to all testing requirements and quality control requirements specified. The Contractor shall contact the NCDOT Division QA Supervisor prior to producing plant mix and make the Supervisor aware that the mix is being produced for a future NCDOT road. Contact the District Engineer to determine the NCDOT Division QA Supervisor. Only NCDOT approved mix designs will be acceptable. A Quality Control Plan shall be submitted (as Directed by the District Engineer) to the District Engineer's Office prior to asphalt production utilizing form QMS-MV1. Failing mixes and/or densities are subject to penalties including monetary payments or removal and replacement. To minimize traffic queuing in construction areas, the possibility of traffic detours may be considered when working on high traffic routes even if traffic control is used. The District Engineer may require traffic detours.

86. When paving beyond utility installation is involved or as directed by the Engineer, a Roadway certification report sealed by a Professional Engineer shall be submitted to the District Engineer's office indicating the following:
    - Pavement thickness by type
    - Pavement density, core and/or test locations
    - Base thickness
    - Base density
    - Subgrade density

    Test frequency and method shall be in conformance with the NCDOT *Materials and Tests Manual*. Test must be performed by a Certified Technician including name and Certification number on report.

87. "Potholing" pavement cores to expose existing utilities shall be made with an 18" diameter keyhole pavement core. Pavement core locations shall not be placed in the wheel path whenever possible. Vacuum excavation shall be utilized to expose underground utilities. Pavement cores shall be repaired within the same working day. The pavement core shall be retained and reused to fill the core hole.

    The excavation shall be backfilled and compacted with select material to the bottom of the existing pavement structure or as indicated by the District Engineer. The retained core shall be placed in the hole and secured with a waterproof, mechanical joint. If the pavement core is damaged and cannot be re-used, the core may be replaced with the surface mix, S9.5B. The asphalt patch shall match the thickness of the existing asphalt or four inches, whichever is greater. All materials must be listed on the NCDOT Approved Products List (APL) found at: https://apps.ncdot.gov/vendor/approvedproducts/.

88. Open cuts are not permitted on SR 1003 (Camden Road).

89. All open cuts (if permitted) on primary routes will require full depth patching with 5.0" of B 25.0 B (ACBC) Asphalt Concrete Base Course, 3.0" of I 19.0 B (ACIC) Asphalt Concrete Intermediate Course and 2.0" of S 9.5 B (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 2.0" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.

90. All open cuts (if permitted) on secondary routes will require full depth patching with 4.0" of B 25.0 C (ACBC) Asphalt Concrete Base Course and 3.0" of S 9.5 C (ACSC) Asphalt Concrete Surface Course the same day as cut is made. It will also be required to mill the existing pavement surface at a depth of 1.5" and a width of 1.0' on each side of the cut to key in the patch with the existing pavement surface in accordance with the attached detail.

91. Eight inches of ABC will be used as the base. Compaction test shall be performed at the location of every open cut that crosses NCDOT roadways. The owner will be required to have an approved laboratory furnish the District Office a copy of the test results.

92. Pavement cuts shall be repaired the same day the cuts are made unless an asphalt patch cannot be accomplished the same day due to material availability or time restrictions. When the asphalt patch is not feasible, the following apply:
    a. The pavement cut shall be filled to the surface with ABC stone or Flowable Fill per NCDOT's Standards and Specifications.
    b. Once the cut is filled, a minimum ¾-inch steel plate shall be placed and pinned to prevent moving. Plates shall be designed large enough to span a minimum of 1-foot on all sides on the pavement cut.
    c. When flowable fill is used, it shall cure for 24 hours prior to any asphalt material placement. Flowable fill bleed water shall not be present during paving operations. Paving shall not cause damage (shoving, distortion, pumping, etc.) to the flowable fill.
    d. Install and leave "BUMP" signs according to MUTCD until the steel plate has been removed. Once the flowable fill has cured, remove the steel plate, and mill/fill according to the directions of the District Engineer.
    e. All pavement cuts must be sealed with NCDOT approved sealant to prevent future pavement separation or cracking.

93. **Any pavement damaged because of settlement of the pavement or damaged by equipment used to perform encroachment work, shall be re-surfaced to the satisfaction of the District Engineer. This may include the removal of pavement and a 50' mechanical overlay. All pavement work and pavement markings (temporary and final) are the responsibility of the Encroaching Party.**

94. All concrete installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

95. All concrete sidewalk installed within NCDOT rights of way shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01 and 848.01) and Amendments or Supplementals thereto. All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

96. All ADA compliant curb ramps shall be constructed in accordance with the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 848.06) and Amendments or Supplementals thereto including but not limited to the Alternate Curb Ramp Designs (Curb Ramp Details - Parallel Ramps). All concrete shall be an approved NCDOT Class B mix. All materials testing results shall be provided to the District Engineer upon completion of the project.

97. All 30" curb and gutter within NCDOT rights of way shall be constructed with Class B concrete in accordance with Section 846 of the latest NCDOT **Standard Specifications for Roads and Structures** and **Roadway Standard Drawings** (Std. Dwg. No. 846.01) and Amendment or Supplemental thereto or as directed by the engineer. All concrete testing results shall be provided to the District Engineer's office at time of project completion.

Post Construction

Close out/ Inspection

98. The Encroaching party shall notify the District Engineer's office within 2 business days after construction is complete. The District Engineer may perform a construction inspection. Any deficiencies may be noted and reported to the encroaching party to make immediate repairs or resolve any issues to restore the right-of-way to a similar condition prior to construction, including pavement, signage, traffic signals, pavement markings, drainage, structures/pipes, or other highway design features.

99. At the discretion of the District Engineer, a final inspection report may be provided to the encroaching party upon satisfactory completion of the work.

100. A written acknowledgement of the completed work by the District Engineer's office begins the one-year warranty period associated with the performance bond.

101. Within ninety (90) days of the completion of the proposed utility installation, an As-Built drawing(s) and an executed Certification Memo shall be submitted to the District Office (online encroachment database). The As-Built drawing(s) shall depict the horizontal and vertical locations of all utilities and associated appurtenances.

102. A copy (in PDF format) of the completed ground water analysis shall be given to the District Engineer, including detailed drawings of the "as-built" wells showing location, depth and water level in well.

If further information or assistance is needed in reference to this project, please feel free to call Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer at (910) 364-0601.

Sincerely,

DocuSigned by:
Greg W. Burns
C2649BD929294B9...

DS
TLB

Greg W. Burns, PE
Division Engineer

GWB:tlb

cc: https://connect.ncdot.gov/site/Permits/Pages/All-Submissions.aspx

B.8

NCDOT Encroachment Provisions including Traffic Control and Work Zone Safety, Specifications for Erosion Control, Special Provisions (Untrenched Construction/Boring and Jacking, Attachment 1 (Clear Zone Table from Roadside Design Guide), Installation Certification Memo, and Pavement Schedule

TRAFFIC CONTROL AND WORK ZONE SAFETY

The Contractor shall maintain traffic during construction and provide, install, and maintain all traffic control devices in accordance with these project guidelines, the Project Special Provisions, North Carolina Department of Transportation Standard Specifications for Roads and Structures 2018, and the current edition of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall utilize complete and proper traffic controls and traffic control devices during all operations. All traffic control and traffic control devices required for any operation shall be functional and in place prior to the commencement of that operation. Signs for temporary operations shall be removed during periods of inactivity. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists.

Traffic movements through lane closures on roads with two way traffic shall be controlled by flaggers stationed at each end of the work zone. In situations where sight distance is limited, the Contractor shall provide additional means of controlling traffic, including, but not limited to, two-way radios, pilot vehicles, or additional flaggers. Flaggers shall be competent personnel, adequately trained in flagging procedures, and furnished with proper safety devices and equipment, including, but not limited to, safety vests and stop/slow paddles.

All personnel when working in traffic areas or areas in close proximity to traffic shall wear an approved safety vest, or shirt or jacket which meets the color requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall comply with all applicable Federal, State, and local laws, ordinances, and regulations governing safety, health, and sanitation, and shall provide all safeguards, safety devices, and protective equipment, and shall take any other needed actions, on his own responsibility that are reasonably necessary to protect the life and health of employees on the job and the safety of the public, and to protect property in connection with the performance of the work covered by the contract.

Failure to comply with any of the requirements for safety and traffic control of this contract shall result in suspension of work as provided in subarticle 108-7(2) of the Standard Specifications.

SPECIFICATIONS FOR EROSION CONTROL

The Contractor shall seed all disturbed areas as directed by the Engineer, in accordance with Section 1660 of the Standard Specifications. Seeding and mulching shall immediately follow shoulder construction operations and in no case shall shoulder construction operations exceed seeding and mulching operations by more than two weeks without written permission of the Engineer. Failure to meet this requirement shall be cause to cease all operations until it can be met.

Seeding and Mulching: (East)

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined by the Engineer. All rates are in pounds per acre.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

All Roadway Areas

March 1 - August 31		**September 1 - February 28**	
50#	Tall Fescue	50#	Tall Fescue
10#	Centipede	10#	Centipede
25#	Bermudagrass (hulled)	35#	Bermudagrass (unhulled)
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Waste and Borrow Locations

March 1 – August 31		**September 1 - February 28**	
75#	Tall Fescue	75#	Tall Fescue
25#	Bermudagrass (hulled)	35#	Bermudagrass (unhulled)
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Note: 50# of Bahiagrass may be substituted for either Centipede or Bermudagrass only upon Engineer's request.

Approved Tall Fescue Cultivars

2nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

On cut and fill slopes 2:1 or steeper Centipede shall be applied at the rate of 5 pounds per acre and add 20# of Sericea Lespedeza from January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

All areas seeded and mulched shall be tacked with asphalt. Crimping of straw in lieu of asphalt tack shall not be allowed on this project.

CRIMPING STRAW MULCH

Crimping shall be required on this project adjacent to any section of roadway where traffic is to be maintained or allowed during construction. In areas within six feet of the edge of pavement, straw is to be applied and then crimped. After the crimping operation is complete, an additional application of straw shall be applied and immediately tacked with a sufficient amount of undiluted emulsified asphalt.

Straw mulch shall be of sufficient length and quality to withstand the crimping operation.

Crimping equipment including power source shall be subject to the approval of the Engineer providing that maximum spacing of crimper blades shall not exceed 8".

Within seven (7) calendar days to fourteen (14) calendar days of completion of any phase of grading, all disturbed areas shall be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. The Erosion and Sediment Control plan will identify the areas that require seven (7) and/or fourteen (14) calendar day ground stabilization. The Contractor is herein advised to follow all current regulations set forth by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) as defined in the *General Stormwater Permit for Construction Activities NCG-010000*.

Attachment # 1

Special Provisions

Untrenched Construction

Under no condition shall jetting or wet boring, with water, or utility pipelines or encasements under pavements be allowed.

Boring and Jacking

Smooth wall or spiral weld steel pipe may be jacked through dry bores slightly larger than the pipe bored progressively ahead of the leading edge of the advancing pipe as spoil is mucked by the auger back through the pipe. As the dry boring operation progresses, each new section of the encasement pipe shall be butt-welded to the section previously jacked into place. Encasements shall extend at shoulder sections as shown on Attachment # 2. Encasements shall extend to a point outside of the 1:1 projection from three (3) feet behind curbs to the bottom of the nearest pit excavation wall in curb and gutter sections as shown on Attachment # 3.

If voids are encountered or occur outside the encasement pipe, grout holes shall be installed in the top section of the encasement pipe at ten (10) foot centers and the voids filled with 1:3 Portland Cement Grout at sufficient pressure to prevent settlement in the roadway.

In the event an obstruction is encountered during boring and jacking operations, the auger is to be withdrawn and the excessive pipe is to be cut off, capped and filled with 1:3 Portland Cement Grout at sufficient pressure to fill all voids before moving to another site.

Size and wall thickness (3' min. to 10' max. cover) of smooth wall or spiral welded encasement pipe for boring and jacking is as follows:

Pipe Sizes (O.D.)	Wall Thickness
4' to 12-3/4"	0.188
16" to 24"	0.250
30"	0.312
36"	0.375
48"	0.500

The Engineer on record is responsible for the encasement pipe design for cover greater than 10'.

Materials, joints, protective coating, grouting, wall thickness of carrier pipe, welds and cathodic protection shall be in accordance with the applicable industry or governmental codes, as well as the specifications of the Department of Transportation.

Casing pipe shall be sealed at the ends to prevent flowing water and debris from entering the annular space between the casing and the carrier. Plug with concrete, brick link seal, or other material approved by the District Engineer. Ensure drainage of encasement by leaving a 1 inch diameter weep hole in the seal of the lower end of the encasement.

Pump or place flowable fill into the annular void between the carrier pipe and casing pipe 36 inches or larger.

The grade of the top of the pipe or casing within rights-of-way should provide minimum bury as follows:

A.	Longitudinal installations	3'
B.	Crossings under roadways	3' (Below travel surface)
C.	Crossings under ditches (Paved & unpaved)	2'

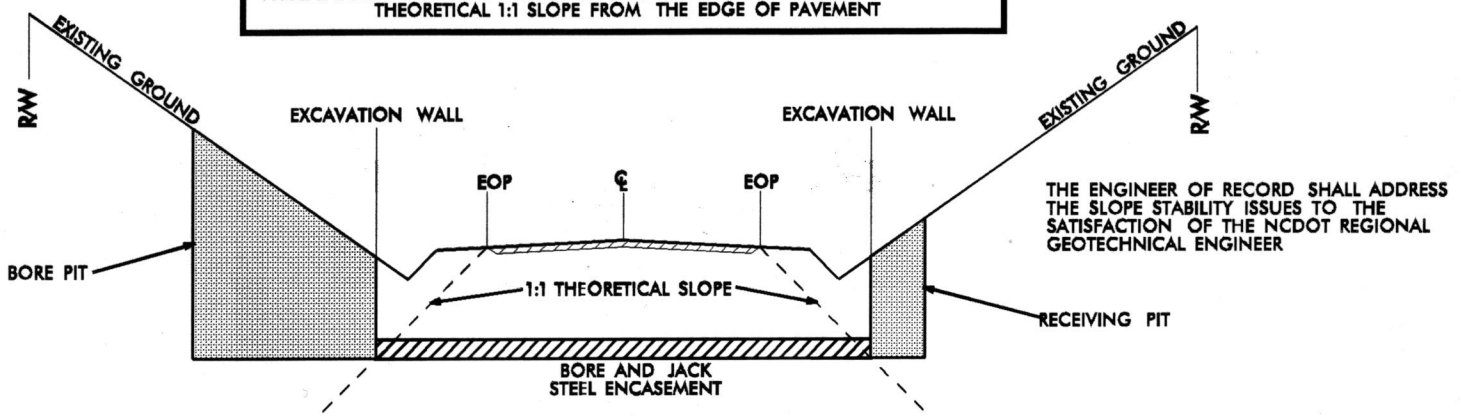
Pipelines carrying flammable, corrosive, expansive energized or unstable transmittants must comply with State, Federal and Utility Codes. In no case shall the depth of bury be less than as indicated above.

REV. 3/11/09

SHOULDER SECTIONS

ATTACHMENT # 2

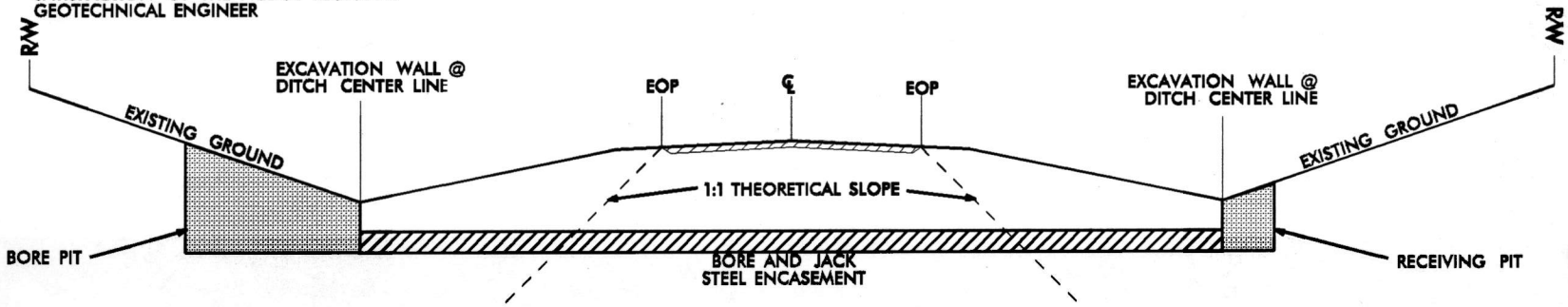
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION OUTSIDE THEORETICAL 1:1 SLOPE FROM THE EDGE OF PAVEMENT



THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER

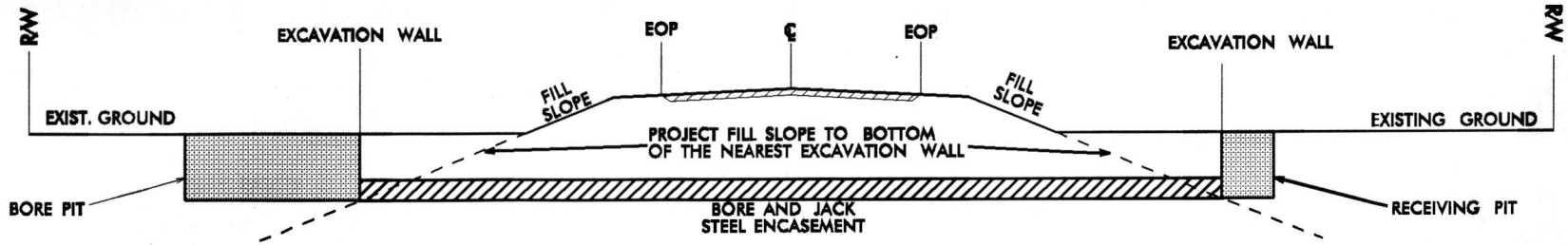
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION WITH DITCHES OUTSIDE THEORETICAL 1:1 SLOPE FROM THE EDGE OF PAVEMENT

THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER



TYPICAL BORE AND JACK INSTALLATION IN ROADWAY IN FILL SECTION

THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER

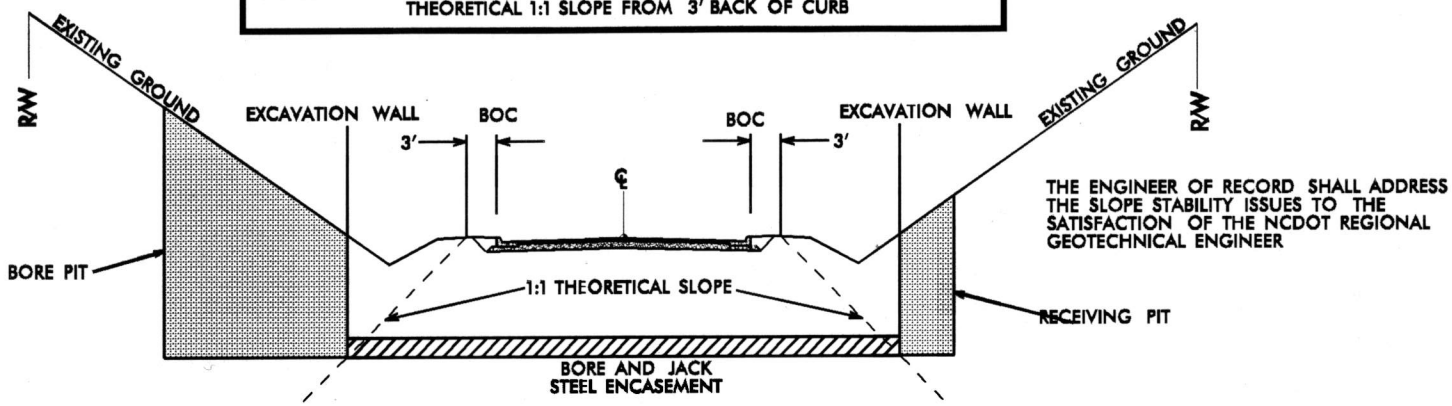


Rev 3/11/09

CURB AND GUTTER SECTIONS

ATTACHMENT # 3

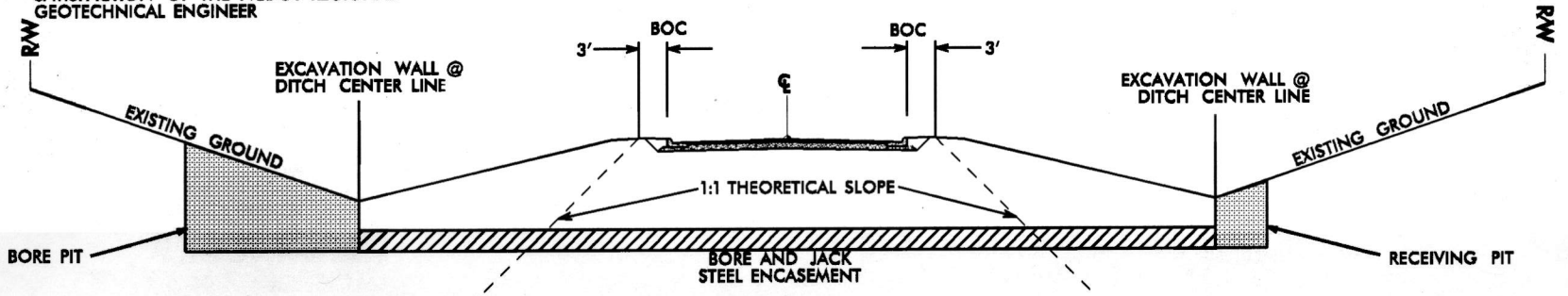
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION OUTSIDE THEORETICAL 1:1 SLOPE FROM 3' BACK OF CURB



THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER

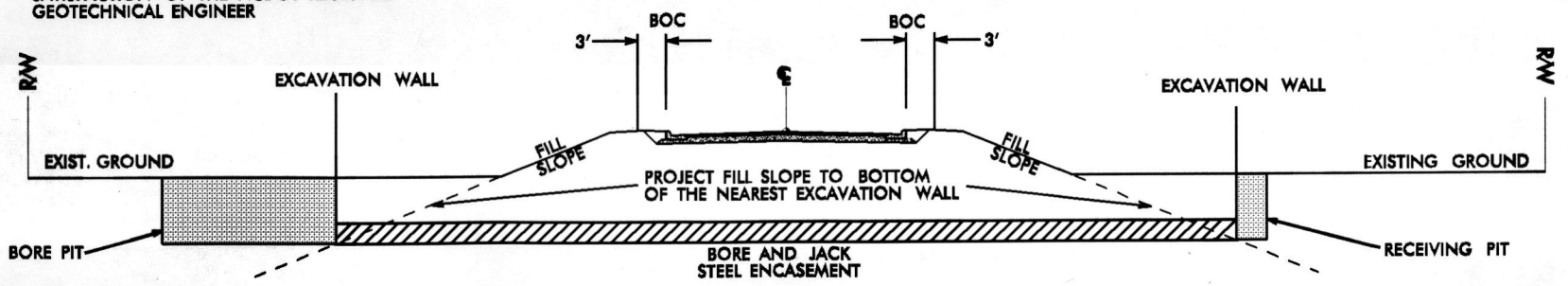
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION WITH DITCHES OUTSIDE THEORETICAL 1:1 SLOPE FROM 3' BACK OF CURB

THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER



TYPICAL BORE AND JACK INSTALLATION IN ROADWAY IN FILL SECTION

THE ENGINEER OF RECORD SHALL ADDRESS THE SLOPE STABILITY ISSUES TO THE SATISFACTION OF THE NCDOT REGIONAL GEOTECHNICAL ENGINEER



REV. 3/11/09

Attachment 1

Clear Zone Table from Roadside Design Guide

Table 3.1 (Cont'd)

[U.S. Customary Units]

DESIGN SPEED	DESIGN ADT	FORESLOPES			BACKSLOPES		
		1V:6H or flatter	1V:5H TO 1V:4H	1V:3H	1V:3H	1V:5H TO 1V:4H	1V:6H or flatter
40 mph or less	UNDER 750	7 - 10	7 - 10	**	7 - 10	7 - 10	7 - 10
	750 - 1500	10 - 12	12 - 14	**	10 - 12	10 - 12	10 - 12
	1500 - 6000	12 - 14	14 - 16	**	12 - 14	12 - 14	12 - 14
	OVER 6000	14 - 16	16 - 18	**	14 - 16	14 - 16	14 - 16
45-50 mph	UNDER 750	10 - 12	12 - 14	**	8 - 10	8 - 10	10 - 12
	750 - 1500	14 - 16	16 - 20	**	10 - 12	12 - 14	14 - 16
	1500 - 6000	16 - 18	20 - 26	**	12 - 14	14 - 16	16 - 18
	OVER 6000	20 - 22	24 - 28	**	14 - 16	18 - 20	20 - 22
55 mph	UNDER 750	12 - 14	14 - 18	**	8 - 10	10 - 12	10 - 12
	750 - 1500	16 - 18	20 - 24	**	10 - 12	14 - 16	16 - 18
	1500 - 6000	20 - 22	24 - 30	**	14 - 16	16 - 18	20 - 22
	OVER 6000	22 - 24	26 - 32*	**	16 - 18	20 - 22	22 - 24
60 mph	UNDER 750	16 - 18	20 - 24	**	10 - 12	12 - 14	14 - 16
	750 - 1500	20 - 24	26 - 32*	**	12 - 14	16 - 18	20 - 22
	1500 - 6000	26 - 30	32 - 40*	**	14 - 18	18 - 22	24 - 26
	OVER 6000	30 - 32*	36 - 44*	**	20 - 22	24 - 26	26 - 28
65-70 mph	UNDER 750	18 - 20	20 - 26	**	10 - 12	14 - 16	14 - 16
	750 - 1500	24 - 26	28 - 36*	**	12 - 16	18 - 20	20 - 22
	1500 - 6000	28 - 32*	34 - 42*	**	16 - 20	22 - 24	26 - 28
	OVER 6000	30 - 34*	38 - 46*	**	22 - 24	26 - 30	28 - 30

* Where a site specific investigation indicates a high probability of continuing crashes, or such occurrences are indicated by crash history, the designer may provide clear-zone distances greater than the clear-zone shown on Table 3.1. Clear zones may be limited to 30 ft for practicality and to provide a consistent roadway template if previous experience with similar projects or designs indicates satisfactory performance.

** Since recovery is less likely on the unshielded, traversable 1V:3H slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicle that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of slope. Determination of the width of the recovery area at the toe of slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and crash histories. Also, the distance between the edge of the through traveled lane and the beginning of the 1V:3H slope should influence the recovery area provided at the toe of slope. While the application may be limited by several factors, the foreslope parameters which may enter into determining a maximum desirable recovery area are illustrated in Figure 3.2 (see Roadside Design Guide).

Table copied from AASHTO *Roadside Design Guide (3rd Edition) 2006*

North Carolina Department of Transportation
Subdivision Road Construct, Driveway Access, and Encroachment
Installation Certification Memo

_____
(Date)

_____
_____
_____
_____
(District Engineer Name & Address)

RE: CONSTRUCTION CERTIFICATION
County: _____
Driveway Permit #: _____
and/or Subdivision I.D. #: _____
and/or Encroachment #: _____
Recording Information *(if applicable)*: _____
Route(s) and/or Street(s): _____
_____
_____
Project Name/Phase/Description: _____
_____
_____

I, _____, have reviewed the construction withinthe right-of-way and/or easements required under subject project(s) for the above development and in accordance with the design drawings approved by the North Carolina Department of Transportation (NCDOT) on the following dates:

Driveway Permit #: _____ Date: _____
and/or Subdivision I.D. #: _____ Date: _____
and/or Encroachment #: _____ Date: _____

My inspection and attached testing report(s) and/or supporting documentation indicate the construction within the right-of-way and/or easements have been constructed in accordance with the standards established by current NCDOT Standard Specifications for Roads and Structures, and with the approved plans.

Name: _____

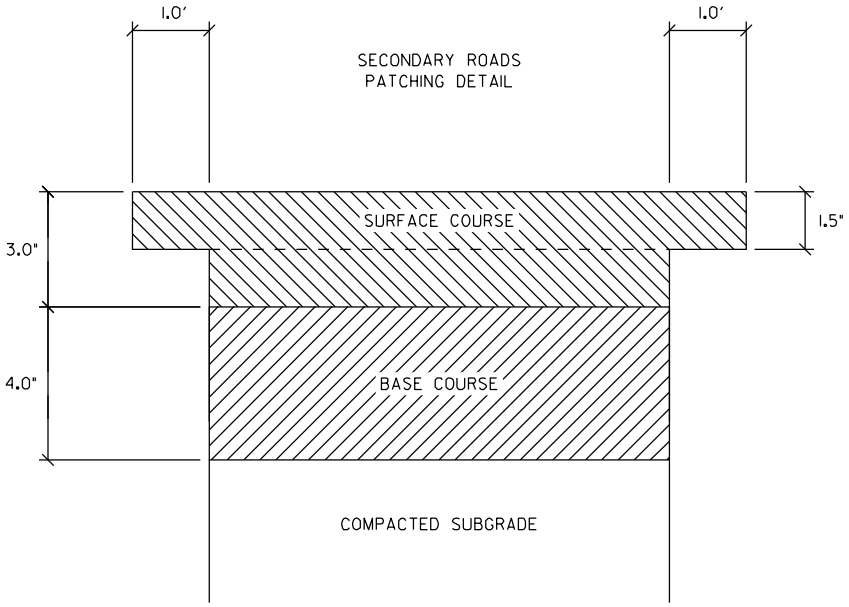
NC PE #: _____

Signature: _____

SEAL

Received by NCDOT: _____

Rev. Div. 6 - Dist. 2



PAVEMENT SCHEDULE

(MILLING REQUIRED ONE FOOT AT DEPTH OF 1.5"
ON EACH SIDE OF PAVEMENT CUT)

3.0" S 9.5 C

4.0" B 25.0 C

DRAWING IS NOT TO SCALE

ATTACHMENT FORM

NOTIFICATION FOR UTILITY / NON-UTILITY ENCROACHMENT WITHIN NCDOT R/W

Instructions for use:
This form must be completed in its entirety and submitted directly to the designated personnel in the District Engineer's office via email, fax or hand delivery a minimum of one week prior to construction for the encroachment. If the designated NCDOT personnel names are unknown by the person completing this form, please contact the District Engineer's office to determine that contact info.

Date: _____ Submitted by Name: _____

To: District Personnel Name: _____
District Personnel Email: _____
District Fax No.: _____

This notification is to inform you that we (encroaching party or their contractor) will begin construction work on the following project in a minimum of one week.

Encroachment number
(assigned by NCDOT) for the project: _____

Construction start date: _____

Approximate ending date: _____

Contact NCDOT inspector a minimum of 72 hrs. in advance to set-up Preconstruction meeting in the District Engineer's office or other location as directed by the District Engineer

Preconstruction meeting date & time: _____

Preconstruction meeting address: _____
_____

Type of project: _____
[Examples: power, telecommunication, water, sewer, gas, petroleum, other (describe)]

Contact Info for this project:

Contractor Company Name:
_____
Contractor Contact Name:
_____
Contractor Phone Number:
_____
Contractor Email:
_____

NCDOT Utility Inspector Name:
_____
NCDOT Utility Inspector Phone:
_____
NCDOT Utility Inspector Email:
_____
NCDOT Utility Project Manager Name:
_____
NCDOT Utility Project Manager Phone:
_____
NCDOT Utility Project Manager Email:
_____

B.9
NCDOT COVID-19 Workforce Safety Plan for Encroachment Activities

WORKFORCE SAFETY PLAN FOR ENCROACHMENT ACTIVITIES: COVID-19

EFFORTS THE N.C. TRANSPORTATION INDUSTRY IS TAKING TO STOP THE SPREAD OF COVID-19

The North Carolina Department of Transportation (NCDOT) and their partners expect all parties involved in the delivery of transportation projects to abide by the guidelines issued from the Centers for Disease Control and Prevention (CDC) and the North Carolina Department of Health and Human Services (NCDHHS).

Response to COVID-19 is rapidly evolving; new information and guidelines may be issued from the CDC, NCDHHS, or other state or federal agencies. NCDOT and their partners should review the current CDC and NCDHHS guidance, including the resources listed at the end of this document, for up-to-date information on how to respond to COVID-19. Additional guidelines may be issued by state or federal agencies that should be followed in addition to the guidance included in this document.

Though certain Americans with Disabilities Act (ADA) requirements have been relaxed in response to the pandemic, employers must still maintain all information about employee illness as a confidential medical record in compliance with the ADA. If an employee is suspected of having or tests positive for COVID-19, it is essential that management keep the identity of the employee and details related to the employee's health confidential.

Below are precautions required by NCDOT and from encroaching parties and their contractors performing construction within NCDOT Rights of Way. The term employee refers to any person on a job site within NCDOT right of way for the purpose of constructing or inspecting the work related to construction of a facility under an approved encroachment agreement and where that employee may or may not be under employment by or under contract to NCDOT.

EMPLOYEE WELLNESS

- If an employee has not yet reported to work and develops any COVID-19 symptoms (i.e. fever, coughing, or shortness of breath) — STAY HOME and immediately:
    - Call a health care provider
    - Self-Isolate
    - Communicate with your supervisor
    - Remain calm and follow all instructions from your health care provider
- Employees who appear to have acute respiratory illness symptoms (i.e. cough, shortness of breath) upon arrival to work, or become sick during the day, should be separated from others and sent home immediately. The potentially affected employees should immediately follow the steps outlined above, which includes immediately contacting a health care provider.
- Should an employee show symptoms of acute respiratory illness or be diagnosed with COVID-19, all other employees who have worked in close proximity to the affected employee during the last 14

days and all encroachment points of contact indicated at the end of this plan should be notified of potential exposure to the disease without identifying the affected employee.

- Consideration should be given to employees at "High Risk" of severe illness from COVID-19, who, per NCDHHS, include employees:
    - Over 65 years of age, **OR**
    - With underlying health conditions including heart disease, lung disease, or diabetes, **OR**
    - With weakened immune system
- "High Risk" Employees should be given the opportunity to discuss alternate work arrangements/duties with their employer or take leave according to their company policies.
- For guidance on confirmed positive tests for COVID-19, refer to the most recent version of the "COVID-19 Guidance for Employees on Encroachment Job Sites within NCDOT Right of Way" located on last page of this plan.

PERSONAL HYGIENE

- Clean hands often by washing with soap and water for 20 seconds. If soap and water are not available and hands are not visibly dirty, an alcohol-based hand sanitizer that contains 60%-95% alcohol may be used.
- Avoid touching your eyes, nose, mouth, or other parts of your face.
- Do not breathe, cough, or sneeze on another person or into the open air. Employees should cover their noses and mouth with a tissue when coughing or sneezing (or an elbow or shoulder if no tissue is available).
- A facemask for covering nose and mouth is encouraged on the job site.
- Appropriate gloves are encouraged while performing functions of the job.

CLEANING/DISINFECTING

- Wash stations and/or hand sanitizer are encouraged on each project site.
- Appropriate cleaning staff should clean frequently touched surfaces and objects with disinfectants at a minimum of once per day.
    - Office/buildings: door knobs, light switches, phones, computers/keyboards, copy machines, elevator buttons, toilets, faucets, sinks, countertops, paper towel dispensers, desktops, handrails, folders, vending machines, counters, tables, cabinets/knobs, etc.
    - Shop Yard/Jobsite: vehicle/equipment door handles, keys, gear shifts, steering wheel/operator controls and levers, fuel pump dispensers, touch points on machinery, etc.
    - Electronic equipment: cell phones, computers, keyboards, etc.
- Appropriate cleaning staff should sanitize/disinfect facilities and work areas after persons suspected/confirmed to have COVID-19 have been in the facility or work area.

- It is recommended to close off access to areas used by the ill persons and wait as long as practical, 24 hours if possible, before beginning cleaning and disinfection to minimize potential for exposure to respiratory droplets. Open outside doors and windows to increase air circulation in the area if possible.
- Appropriate cleaning staff should clean and disinfect all areas used by the ill persons, focusing especially on frequently touched surfaces.

GENERAL

- Increase communication measures between all parties regarding schedule, daily activities, etc. to reduce/minimize worker exposure in accordance with but not limited to the requirements below.
- Minimize on-site personnel such as subcontractors, work crews, QC personnel, and inspection staff to those required for that day's activities. If work is postponed or cancelled, immediately notify appropriate parties.
- Practice "Social Distancing" whenever feasible. Social Distancing is designed to limit the spread of a disease by reducing the opportunities for close contact between people. All personnel have the responsibility to remind each other to stay 6 feet or more apart. Examples of Social Distancing include:
  - Reducing face-to-face exposure by using conference calls and video conferencing
    - If an in-person meeting is absolutely required and cannot be rescheduled or attended remotely, the meeting is limited to a maximum of 10 people while maintaining Social Distancing of 6 feet or more.
  - Avoiding unnecessary travel
- Do not congregate at lunch or breaks. Bringing your lunch is encouraged.
- No communal coolers or drink stations are allowed. Supervisors should confirm with employees prior to beginning work for appropriate hydration and nutrition availability to employees for the duration of the employee's shift and without direct contact with others on the job site.
- First line of communication should be by phone, rather than in-person.
- Do not shake hands.
- Do not share iPads, tablets, pens, or clipboards for signing or any other purpose. Take pictures as proof of attendance at meetings.
- Sharing of Personal Protective Equipment (PPE) is strictly prohibited.
- Vehicles, equipment, and tools
  - Limit the number of people riding in a vehicle together.
  - Wipe down and disinfect vehicles after each trip.
  - As much as possible, do not share tools or equipment. If a tool or piece of equipment must be shared, the parts of it that are touched should be sanitized between uses.

RETURN TO WORK

- The following criteria must be followed for an employee who is tested for Covid-19, or asked to self-quarantine by health officials, or has contact with another employee with a positive test result to return to work:
    - at least a 14-day quarantine; **OR**
    - release by a health care provider.
- In accordance with CDC guidance, the following criteria must be followed for an employee with a positive test result to return to work:
    - at least 14 days from positive test notification; **AND**
    - at least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath); **AND**
    - at least 7 days have passed since symptoms first appeared.

  NCDOT may require certification of fitness to work from a health care provider.

ADDITIONAL RESOURCES

NCDOT and their partners should review the CDC and NCDHHS resources listed below for up-to-date information on how to respond to COVID-19. Additional guidelines may be issued by state or federal agencies that should be followed in addition to the guidelines included in this document.

- NCDHHS COVID-19 Resources:
    - https://www.ncdhhs.gov/divisions/public-health/coronavirus-disease-2019-covid-19-response-north-carolina
- NCOSHR Communicable Disease Emergency Policy
    - https://oshr.nc.gov/policies-forms/workplace-wellness/communicable-disease-emergency
- OSHA Guidance on Preparing Workplaces for COVID-19
    - https://www.osha.gov/Publications/OSHA3990.pdf
- CDC COVID-19 Resources:
    - https://www.cdc.gov/coronavirus/2019-ncov/index.html

AGREEMENT

The encroaching party shall adhere to the requirements of this plan in order to continue work under their approved encroachment agreement. Violations to this plan could result in the violating entity not being allowed to continue work or all work ceasing as determined by the NCDOT District Engineer or Resident Engineer.

PROJECT POINTS OF CONTACT

NCDOT

Name: DocuSigned by: Troy L. Baker C2648BD929294B9...

Phone #: (910) 364-0601

Encroaching Party (Primary Contact)

Name: _____

Phone #: _____

Primary Contractor to Encroaching Party (Point of Contact)

Name: _____

Phone #: _____

COVID-19 Guidance for Employees on Encroachment Job sites within NCDOT Right of Way				
Relationship to Confirmed POSITIVE Test		**CONTACT GROUP**		
		What YOU Should Do	**What your CREW Should Do** *Exposure within 6' and longer than 10 minutes*	**What PROJECT SITE Personnel Should Do** *No exposure within 6' and longer than 10 minutes*
Employee		Notify your supervisor Self-quarantine for 14 days	Advise of POSITIVE test without identifying the affected employee* Directly exposed crew self-quarantine for 14 days Continue hygiene & disinfecting measures	Advise of POSITIVE test without identifying the affected employee* Site personnel without direct contact may continue onsite work or follow their company policy Continue hygiene & disinfecting measures
Direct Contact *Interaction with an infected person within 6' and longer than 10 minutes*		Self-quarantine for 14 days	Advise of POSITIVE test without identifying the affected employee* Crew may continue onsite work or follow their company policy Continue hygiene & disinfecting measures	Advise of POSITIVE test * Continue hygiene & disinfecting measures
Secondary Contact		You may continue onsite work or follow your company policy Continue hygiene & disinfecting measures	Continue hygiene & disinfecting measures	Continue hygiene & disinfecting measures
Two or more Persons Removed from Contact		Continue hygiene & disinfecting measures	Continue hygiene & disinfecting measures	Continue hygiene & disinfecting measures
***Notification Protocol** *(Comply with HIPAA & ADA confidentiality requirements)*	NCDOT employee / agent tests POSITIVE	NCDOT District Engineer/Resident Engineer notifies Encroaching Party's primary point of contact and Contractor Point of Contact, CDC and, if Resident Engineer has oversight for the job site, FHWA any Consultant Firms working for NCDOT Encroaching party representative notifies other Contractors, Sub-Contractors and Suppliers with exposed Employees		
	Encroaching Party or Contract crew member on job site tests POSITIVE	Encroaching party representative or Contractor point of contact notifies appropriate NCDOT District Engineer or Resident Engineer and all other Contractors, Sub-Contractors and Suppliers with exposed Employees NCDOT notifies CDC, and as appropriate, FHWA and any Consultant Firms working for NCDOT		

B.10
Approval of 401 Water Quality Certification
DWR # 20-0694

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
S. DANIEL SMITH
Director

NORTH CAROLINA
Environmental Quality

July 9, 2020

DWR # 20-0694
Cumberland County

Fayetteville Public Works Commission
Attn: Joe Glass
P.O. Box 1089
Fayetteville, NC 28302

Subject: APPROVAL OF 401 WATER QUALITY CERTIFICATION WITH ADDITIONAL CONDITIONS

Big Rockfish Creek Outfall

Dear Mr. Glass:

You have our approval for the impacts listed below for the purpose described in your application dated May 26, 2020, received by the Division of Water Resources (Division) May 26, 2020 and payment received on May 27, 2020 and additional information provided on July 7, 2020. These impacts are covered by the attached Water Quality General Certification Number(s) 4133 and the conditions listed below. This certification is associated with the use of Nationwide Permit Number(s) 12 once it is issued to you by the U.S. Army Corps of Engineers. Please note that you should get any other federal, state or local permits before proceeding with your project, including those required by (but not limited to) Sediment and Erosion Control, Non-Discharge, and Water Supply Watershed regulations.

This approval requires you to follow the conditions listed in the enclosed certification(s) or general permit and the following additional conditions:

1. The following impacts are hereby approved provided that all of the other specific and general conditions of the Certification are met. No other impacts are approved, including incidental impacts. [15A NCAC 02H .0506(b)].

Type of Impact	Amount Approved (units) Permanent	Amount Approved (units) Temporary
Wetland Impact	1.782 (acres) (Conversion only – no permanent fill)	6.041 (acres) (Construction corridor)
Open Water	(acres)	0.123 (acres)
Perennial Stream	(linear feet)	335 (linear feet)
Intermittent Stream	(linear feet)	205 (linear feet)

2. This approval is for the purpose and design described in your application and the additional information provided. The plans and specifications for this project are incorporated by reference as part of the Certification. If you change your project, you must notify the Division and you may be required to submit a new application package with the appropriate fee. If the property is sold, the new owner must be given a copy of this approval letter and General Certification(s)/Permit/Authorization and is responsible for complying with all conditions. [15A NCAC 02H .0507(d)(2)].

3. Any additional impacts to streams and/or wetlands as a result of future roads, buildings, driveways, utility lines or other activities related to the Big Rockfish Creek Outfall may be considered cumulative to impacts approved in this Certification and may require a modification of this 401 Water Quality Certification approval. [15A NCAC 02H .0506(4) and 15A NCAC 02H .0501 and .0502]

4. The permittee shall report to the Fayetteville Regional Office any noncompliance with this certification, any violation of stream or wetland standards [15A NCAC 02B .0200] including but not limited to sediment impacts, and any violation of state regulated riparian buffer rules [15A NCAC 02B .0200]. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the applicant became aware of the circumstances. A written submission shall also be provided within 5 business days of the time the applicant becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, if the noncompliance has not been corrected, the anticipated time compliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Division may waive the written submission requirement on a case-by-case basis.

5. All wetlands, streams, surface waters, and riparian buffers located within 50 feet of the construction area on the project site shall be clearly marked (example- orange fabric fencing) prior to any land disturbing activities and must be maintained on the property until the project phase is completed. [15A NCAC 02H .0506 (b)(2) and (c)(2) and 15A NCAC 02H .0507 (c)].

This approval and its conditions are final and binding unless contested. [G.S. 143-215.5]

This Certification can be contested as provided in Articles 3 and 4 of General Statute 150B by filing a written petition for an administrative hearing to the Office of Administrative Hearings (hereby known as OAH) **within sixty (60) calendar days**.

A petition form may be obtained from the OAH at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000 for information. A petition is considered filed when the original and one (1) copy along with any applicable OAH filing fee is received in the OAH during normal office hours (Monday through Friday between 8:00am and 5:00pm, excluding official state holidays).

The petition may be faxed to the OAH at (919) 431-3100, provided the original and one copy of the petition along with any applicable OAH filing fee is received by the OAH within five (5) business days following the faxed transmission.

Mailing address for the OAH:

If sending via US Postal Service:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714

If sending via delivery service (UPS, FedEx, etc):

Office of Administrative Hearings
1711 New Hope Church Road
Raleigh, NC 27609-6285

One (1) copy of the petition must also be served to Department of Environmental Quality:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

This letter completes the review of the Division under section 401 of the Clean Water Act. Please contact Chad Turlington at 910-433-3320 or chad.turlington@ncdenr.gov if you have any questions or concerns.

Sincerely,

DocuSigned by:
Mark Brantley
E4E1A9691DB248E...

Mark Brantley
Assistant Regional Supervisor
Division of Water Resources
Water Quality Regional Operations Section

Enclosures: GC4133

Cc: Alex Aycrigg –Froehling & Robertson, Inc. - via email
Emily Greer - USACE Wilmington Regulatory Field Office - via email
FRO File

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES

WATER QUALITY GENERAL CERTIFICATION NO. 4133

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR US ARMY CORPS OF ENGINEERS

- **NATIONWIDE PERMIT 12 (UTILITY LINE ACTIVITIES)**

Water Quality Certification Number 4133 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Regulations in 15A NCAC 02H .0500 and 15A NCAC 02B .0200 for the discharge of fill material to surface waters and wetland areas as described in 33 CFR 330 Appendix A (B) (12) of the US Army Corps of Engineers regulations.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Effective date: December 1, 2017

Signed this day: December 1, 2017

By

for Linda Culpepper
Interim Director

Activities meeting any one (1) of the following thresholds or circumstances require *written approval* for a 401 Water Quality Certification from the Division of Water Resources (DWR):

a) If any of the Conditions of this Certification (listed below) cannot be met; or
b) Total permanent impacts to wetlands or open waters equal to or greater than one-tenth (1/10) acre within the entire utility project; or
c) Any permanent impacts to streams; or
d) Total temporary impacts to streams greater than 500 feet within the entire utility project; or
e) Any stream relocation or stream restoration; or
f) Any high-density utility line and associated facilities project, as defined in 15A NCAC 02H .1003(2)(a) and by the density thresholds specified in 15A NCAC 02H .1017, which:
    i. Disturbs one acre or more of land (including a project that disturbs less than one acre of land that is part of a larger common plan of development or sale); and
    ii. Has permanent wetland, stream or open water impacts; and
    iii. Is proposing new built-upon area; and
    iv. Does not have a stormwater management plan reviewed and approved under a state stormwater program[1] or a state-approved local government stormwater program[2].

    Projects that have vested rights, exemptions, or grandfathering from state or locally-implemented stormwater programs and projects that satisfy state or locally-implemented stormwater programs through use of community in-lieu programs **require written approval**; or
g) Any permanent impacts to waters, or to wetlands adjacent to waters, designated as: ORW (including SAV), HQW (including PNA), SA, WS-I, WS-II, Trout, or North Carolina or National Wild and Scenic River; or
h) Any permanent impacts to coastal wetlands [15A NCAC 07H .0205], or Unique Wetlands (UWL); or
i) Any impact associated with a Notice of Violation or an enforcement action for violation(s) of NC Wetland Rules (15A NCAC 02H .0500), NC Isolated Wetland Rules (15A NCAC 02H .1300), NC Surface Water or Wetland Standards (15A NCAC 02B .0200), or State Regulated Riparian Buffer Rules (15A NCAC 02B .0200); or
j) Any impacts to subject water bodies and/or state regulated riparian buffers along subject water bodies in the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman Lake, Jordan Lake or Goose Creek Watersheds (or any other basin or watershed with State Regulated Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) *unless:*
    i. The activities are listed as "EXEMPT" from these rules; or
    ii. A Buffer Authorization Certificate is issued by the NC Division of Coastal Management (DCM); or

[1] e.g. Coastal Counties, HQW, ORW, or state-implemented Phase II NPDES
[2] e.g. Delegated Phase II NPDES, Water Supply Watershed, Nutrient-Sensitive Waters, or Universal Stormwater Management Program

iii. A Buffer Authorization Certificate or a Minor Variance is issued by a delegated or designated local government implementing a state riparian buffer program pursuant to 143-215.23.

Activities included in this General Certification that do not meet one of the thresholds listed above do not require written approval.

I. ACTIVITY SPECIFIC CONDITIONS:

1. All sewer lines shall be designed, constructed and maintained in accordance with Title 15A NCAC Chapter 02T.

2. Any utility construction corridor that is parallel to a stream or open water shall not be closer than 10 feet to the top of bank or ordinary high-water mark. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506 (b)(4) and (c)(4)]

3. Where there are temporary or permanent impacts from stream crossings, utility lines shall cross the stream channel at a near-perpendicular direction (i.e., between 75 degrees and 105 degrees to the stream bank). Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506 (b)(2) and (c)(2)]

4. Construction corridors in wetlands and across stream channels shall be minimized to the maximum extent practicable and shall not exceed 50 feet wide for gas utility lines and 40 feet wide for all other utility lines. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506 (b)(2) and (c)(2)]

   For construction corridors in wetlands and across stream channels, stumps shall be grubbed only as needed to install the utility and remaining stumps shall be cut off at grade level. The general stripping of topsoil within wetlands along the construction corridor is not permitted.

5. Permanent maintained access corridors in wetlands and across stream channels shall be restricted to the minimum width practicable and shall not exceed 30 feet wide for gas utility lines and 20 feet wide for all other utility lines except at manhole locations. 15-foot by 15-foot perpendicular vehicle turnarounds shall be allowed in access corridors but must be spaced at least 500 feet apart. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506 (b)(2) and (c)(2)]

6. For all utility lines constructed within wetlands, an anti-seep collar shall be placed at the downstream (utility line gradient) wetland boundary and every 150 feet up the gradient until the utility exits the wetland. Anti-seep collars may be constructed with class B concrete, compacted clay, PVC pipe, or metal collars. Wetland crossings that are directionally drilled, and perpendicular wetland crossings that are open cut and less than 150 feet long do not require anti-seep collars. The compacted clay shall have a specific

infiltration of 1 X 10^{-5} cm/sec or less. A section and plan view diagram is attached for the anti-seep collars. [15A NCAC 02H .0506 (b)(4) and (c)(4)]

The following specifications shall apply to class B concrete:

a. Minimum cement content, sacks per cubic yard with rounded coarse aggregate 5.0
b. Minimum cement content, sacks per cubic yard with angular coarse aggregate 5.5
c. Maximum water-cement ratio gallons per sack 6.8
d. Slump range 2" to 4"
e. Minimum strength - 28-day psi 2,500

7. The applicant shall have a specific plan for restoring wetland contours. Any excess material will be removed to a high ground disposal area. [15A NCAC 02H .0506 (b)(2) and (c)(2)]

   The mixing of topsoil and subsoils within the wetlands along utility corridors shall be minimized to the greatest extent practical. During excavation, the soils shall be placed on fabric to minimize impacts whenever possible. Topsoil excavated from utility trenches will be piled separately from subsoils and will be backfilled into the trench only after the subsoils have been placed and compacted.

8. For the North Carolina Department of Transportation, compliance with the NCDOT's individual NPDES permit NCS000250 shall serve to satisfy this condition. All other high-density utility line and associated facilities projects that trigger threshold Item (f) above shall comply with one of the following requirements: [15A NCAC 02H .0506(b)(5) and (c)(5)]

   a. Provide a completed Stormwater Management Plan (SMP) for review and approval, including all appropriate stormwater control measure (SCM) supplemental forms and associated items, that complies with the high-density development requirements of 15A NCAC 02H .1003. Stormwater management shall be provided throughout the entire project area in accordance with 15A NCAC 02H .1003. For the purposes of 15A NCAC 02H .1003(2)(a), density thresholds shall be determined in accordance with 15A NCAC 02H .1017.

   b. Provide documentation (including calculations, photos, etc.) that the project will not cause degradation of downstream surface waters. Documentation shall include a detailed analysis of the hydrological impacts from stormwater runoff when considering the volume and velocity of stormwater runoff from the project built upon area and the size and existing condition of the receiving stream(s).

   Exceptions to this condition require application to and written approval from DWR.

II. GENERAL CONDITIONS:

1. When written authorization is required, the plans and specifications for the project are incorporated into the authorization by reference and are an enforceable part of the Certification. Any modifications to the project require notification to DWR and may require an application submittal to DWR with the appropriate fee. [15A NCAC 02H .0501 and .0502]

2. No waste, spoil, solids, or fill of any kind shall occur in wetlands or waters beyond the footprint of the impacts (including temporary impacts) as authorized in the written approval from DWR; or beyond the thresholds established for use of this Certification without written authorization. [15A NCAC 02H .0501 and .0502]

   No removal of vegetation or other impacts of any kind shall occur to state regulated riparian buffers beyond the footprint of impacts approved in a Buffer Authorization or Variance or as listed as an exempt activity in the applicable riparian buffer rules. [15A NCAC 02B .0200]

3. In accordance with 15A NCAC 02H .0506(h) and Session Law 2017-10, compensatory mitigation may be required for losses of greater than 300 linear feet of perennial streams and/or greater than one (1) acre of wetlands. Impacts associated with the removal of a dam shall not require mitigation when the removal complies with the requirements of Part 3 of Article 21 in Chapter 143 of the North Carolina General Statutes. Impacts to isolated and other non-404 jurisdictional wetlands shall not be combined with 404 jurisdictional wetlands for the purpose of determining when impact thresholds trigger a mitigation requirement. For linear publicly owned and maintained transportation projects that are not determined to be part of a larger common plan of development by the US Army Corps of Engineers, compensatory mitigation may be required for losses of greater than 300 linear feet per perennial stream.

   Compensatory stream and/or wetland mitigation shall be proposed and completed in compliance with G.S. 143-214.11. For applicants proposing to conduct mitigation within a project site, a complete mitigation proposal developed in accordance with the most recent guidance issued by the US Army Corps of Engineers Wilmington District shall be submitted for review and approval with the application for impacts.

4. All activities shall be in compliance with any applicable State Regulated Riparian Buffer Rules in Chapter 2 of Title 15A.

5. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur. [15A NCAC 02H .0506 (b)(3) and (c)(3) and 15A NCAC 02B .0200]

   Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*, or for linear transportation projects, the *NCDOT Sediment and Erosion Control Manual*.

   All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*. Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-I, WS-II, High Quality Waters (HQW), or Outstanding Resource Waters (ORW), then the sedimentation and erosion control designs shall comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds*.

6. Sediment and erosion control measures shall not be placed in wetlands or waters except within the footprint of temporary or permanent impacts authorized under this Certification. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0501 and .0502]

7. Erosion control matting that incorporates plastic mesh and/or plastic twine shall not be used along streambanks or within wetlands. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02B .0201]

8. An NPDES Construction Stormwater Permit (NCG010000) is required for construction projects that disturb one (1) or more acres of land. The NCG010000 Permit allows stormwater to be discharged during land disturbing construction activities as stipulated in the conditions of the permit. If the project is covered by this permit, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required. [15A NCAC 02H .0506(b)(5) and (c)(5)]

   The North Carolina Department of Transportation (NCDOT) shall be required to be in full compliance with the conditions related to construction activities within the most recent version of their individual NPDES (NCS000250) stormwater permit. [15A NCAC 02H .0506(b)(5) and (c)(5)]

9. All work in or adjacent to streams shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the *NC Sediment and Erosion Control Manual*, or the *NC DOT Construction and Maintenance Activities Manual*, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506(b)(3) and (c)(3)]

10. If activities must occur during periods of high biological activity (e.g. sea turtle nesting, fish spawning, or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities. [15A NCAC 02H .0506 (b)(2) and 15A NCAC 04B .0125]

All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) shall be implemented. Exceptions to this condition require written approval by the resource agency responsible for the given moratorium. A copy of the approval from the resource agency shall be forwarded to DWR.

Work within a designated trout watershed of North Carolina (as identified by the Wilmington District of the US Army Corps of Engineers), or identified state or federal endangered or threatened species habitat, shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

11. Culverts shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. The dimension, pattern, and profile of the stream above and below a pipe or culvert shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed culvert shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. [15A NCAC 02H .0506(b)(2) and (c)(2)]

    Placement of culverts and other structures in streams shall be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20% of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life.

    If multiple pipes or barrels are required, they shall be designed to mimic the existing stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel shall be avoided.

    When topographic constraints indicate culvert slopes of greater than 5%, culvert burial is not required, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/connectivity has been provided when possible (e.g. rock ladders, cross vanes, etc.). Notification, including supporting documentation to include a location map of the culvert, culvert profile drawings, and slope calculations, shall be provided to DWR 60 calendar days prior to the installation of the culvert.

    When bedrock is present in culvert locations, culvert burial is not required provided that there is sufficient documentation of the presence of bedrock. Notification, including supporting documentation such as a location map of the culvert, geotechnical reports, photographs, etc. shall be provided to DWR a minimum of 60 calendar days prior to the installation of the culvert. If bedrock is discovered during construction, then DWR shall be notified by phone or email within 24 hours of discovery.

    If other site-specific topographic constraints preclude the ability to bury the culverts as described above and/or it can be demonstrated that burying the culvert would result in destabilization of the channel, then exceptions to this condition require application to and written approval from DWR.

Installation of culverts in wetlands shall ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. When roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges shall be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

The establishment of native woody vegetation and other soft stream bank stabilization techniques shall be used where practicable instead of rip-rap or other bank hardening methods.

12. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means to the maximum extent practicable (e.g. grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Exceptions to this condition require application to and written approval from DWR. [15A NCAC 02H .0506(b)(5)]

13. Application of fertilizer to establish planted/seeded vegetation within disturbed riparian areas and/or wetlands shall be conducted at agronomic rates and shall comply with all other Federal, State and Local regulations. Fertilizer application shall be accomplished in a manner that minimizes the risk of contact between the fertilizer and surface waters. [15A NCAC 02B .0200 and 15A NCAC 02B .0231]

14. If concrete is used during construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state. [15A NCAC 02B .0200]

15. All proposed and approved temporary fill and culverts shall be removed and the impacted area shall be returned to natural conditions within 60 calendar days after the temporary impact is no longer necessary. The impacted areas shall be restored to original grade, including each stream's original cross sectional dimensions, planform pattern, and longitudinal bed profile. For projects that receive written approval, no temporary impacts are allowed beyond those included in the application and authorization. All temporarily impacted sites shall be restored and stabilized with native vegetation. [15A NCAC 02H .0506(b)(2) and (c)(2)]

16. All proposed and approved temporary pipes/culverts/rip-rap pads etc. in streams shall be installed as outlined in the most recent edition of the *North Carolina Sediment and Erosion Control Planning and Design Manual* or the *North Carolina Surface Mining Manual* or the *North Carolina Department of Transportation Best Management Practices for Construction and Maintenance Activities* so as not to restrict stream flow or cause dis-equilibrium during use of this Certification. [15A NCAC 02H .0506(b)(2) and (c)(2)]

17. Any rip-rap required for proper culvert placement, stream stabilization, or restoration of temporarily disturbed areas shall be restricted to the area directly impacted by the approved construction activity. All rip-rap shall be placed such that the original stream elevation and streambank contours are restored and maintained. Placement of rip-rap or other approved materials shall not result in de-stabilization of the stream bed or banks upstream or downstream of the area or in a manner that precludes aquatic life passage. [15A NCAC 02H .0506(b)(2)]

18. Any rip-rap used for stream or shoreline stabilization shall be of a size and density to prevent movement by wave, current action, or stream flows and shall consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures. [15A NCAC 02H .0506(b)(2)]

19. Applications for rip-rap groins proposed in accordance with 15A NCAC 07H .1401 (NC Division of Coastal Management General Permit for construction of Wooden and Rip-rap Groins in Estuarine and Public Trust Waters) shall meet all the specific conditions for design and construction specified in 15A NCAC 07H .1405.

20. All mechanized equipment operated near surface waters shall be inspected and maintained regularly to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials. Construction shall be staged in order to minimize the exposure of equipment to surface waters to the maximum extent practicable. Fueling, lubrication and general equipment maintenance shall be performed in a manner to prevent, to the maximum extent practicable, contamination of surface waters by fuels and oils. [15A NCAC 02H .0506(b)(3) and (c)(3) and 15A NCAC 02B .0211 (12)]

21. Heavy equipment working in wetlands shall be placed on mats or other measures shall be taken to minimize soil disturbance. [15A NCAC 02H .0506(b)(3) and (c)(3)]

22. In accordance with 143-215.85(b), the applicant shall report any petroleum spill of 25 gallons or more; any spill regardless of amount that causes a sheen on surface waters; any petroleum spill regardless of amount occurring within 100 feet of surface waters; and any petroleum spill less than 25 gallons that cannot be cleaned up within 24 hours.

23. If an environmental document is required under the State Environmental Policy Act (SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse. If an environmental document is required under the National Environmental Policy Act (NEPA), then this General Certification is not valid until a Categorical Exclusion, the Final Environmental Assessment, or Final Environmental Impact Statement is published by the lead agency. [15A NCAC 01C .0107(a)]

24. This General Certification does not relieve the applicant of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to, Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and Trout Buffer regulations.

25. The applicant and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If DWR determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then DWR may revoke or modify a written authorization associated with this General Water Quality Certification. [15A NCAC 02H .0507(d)]

26. The permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this Certification. A copy of this Certification, including all conditions shall be available at the project site during the construction and maintenance of this project. [15A NCAC 02H .0507 (c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

27. When written authorization is required for use of this Certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return a certificate of completion (available on the DWR website: https://edocs.deq.nc.gov/Forms/Certificate-of-Completion). [15A NCAC 02H .0502(f)]

28. Additional site-specific conditions, including monitoring and/or modeling requirements, may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards. [15A NCAC 02H .0507(c)]

29. If the property or project is sold or transferred, the new permittee shall be given a copy of this Certification (and written authorization if applicable) and is responsible for complying with all conditions. [15A NCAC 02H .0501 and .0502]

III. GENERAL CERTIFICATION ADMINISTRATION:

1. In accordance with North Carolina General Statute 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. An applicant for a CAMA permit under Article 7 of Chapter 113A of the General Statutes for which a Water Quality Certification is required shall only make one payment to satisfy both agencies; the fee shall be as established by the Secretary in accordance with 143-215.3D(e)(7).

2. This Certification neither grants nor affirms any property right, license, or privilege in any waters, or any right of use in any waters. This Certification does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person and this Certification does not create any prescriptive right or any right of priority regarding any usage of water. This Certification shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water use. No consumptive user is deemed by virtue of this Certification to possess any prescriptive or other right of priority with respect to any other consumptive user regardless of the quantity of the withdrawal or the date on which the withdrawal was initiated or expanded.

3. This Certification grants permission to the Director, an authorized representative of the Director, or DWR staff, upon the presentation of proper credentials, to enter the property during normal business hours. [15A NCAC 02H .0502(e)]

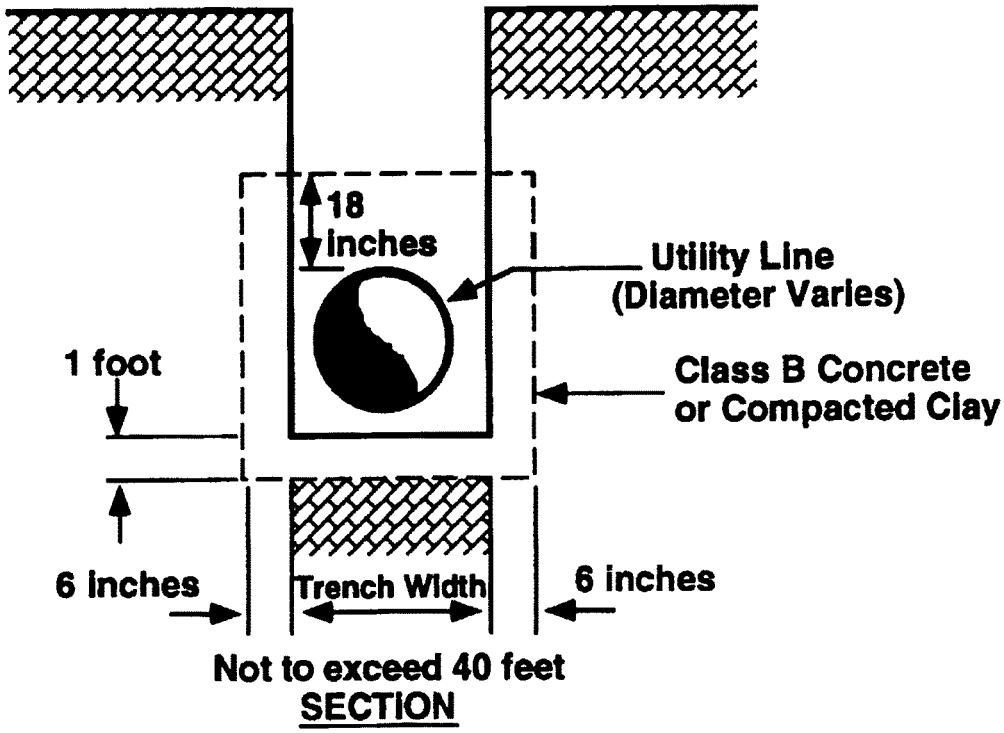
4. This General Certification shall expire on the same day as the expiration date of the corresponding Nationwide Permit and/or Regional General Permit. The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification. This General Certification is rescinded when the US Army Corps of Engineers reauthorizes any of the corresponding Nationwide Permits and/or Regional General Permits or when deemed appropriate by the Director of the Division of Water Resources.

5. Non-compliance with or violation of the conditions herein set forth by a specific project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

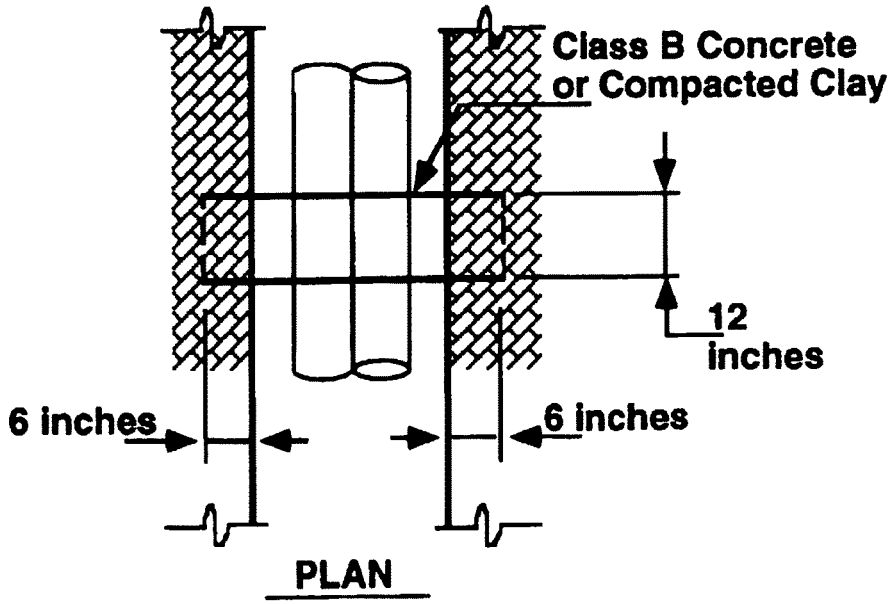
6. The Director of the North Carolina Division of Water Resources may require submission of a formal application for Individual Certification for any project in this category of activity if it is deemed in the public's best interest or determined that the project is likely to have a significant adverse effect upon water quality, including state or federally listed endangered or threatened aquatic species, or degrade the waters so that existing uses of the water or downstream waters are precluded.

History Note: Water Quality Certification (WQC) Number 4133 issued December 1, 2017 replaces WQC 4086 issued March 3, 2017; WQC 3884 issued March 19, 2012; WQC Number 3819 issued March 19, 2010; WQC Number 3699 issued November 1, 2007; WQC Number 3625 issued March 19, 2007; WQC Number 3374 issued March 18, 2002; WQC Number 3288 issued June 1, 2000; WQC Number 3101 issued February 11, 1997; WQC Number 3022 issued September 6, 1995, WQC Number 2664 issued January 21, 1992.

ANTI -SEEP COLLAR



SECTION



PLAN

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
S. DANIEL SMITH
Director

NORTH CAROLINA
Environmental Quality

DWR Project No.: _____ County: _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion

Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the DWR Central Office – Wetlands and Buffers Permitting Unit at 1650 Mail Service Center, Raleigh, NC 27699-1650. This form may be returned to DWR by the applicant, the applicant's authorized agent, **or** the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

If this project was designed by a Certified Professional

I, _____, as a duly registered Professional _____ (i.e., Engineer, Landscape Architect, Surveyor, etc.) in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, for the Permitee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Registration No. _____

Date _____

B.11
USACE General Permit Verification Nationwide 12,
Utility Line Activities-SAW-2020-00952

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2020-00952** County: **Cumberland** U.S.G.S. Quad: **NC-Hope Mills**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Permittee: **City of Fayetteville PWC**
Joe Glass
Address: **PO Box 1089**
Fayetteville, NC 28302
Telephone Number: **910.630.3330**
E-mail: **joe.glass@faypwc.com**

Size (miles) **5.3**
Nearest Waterway **Rockfish Creek**
USGS HUC **03030004**

Nearest Town **Parkton**
River Basin **Cape Fear**
Coordinates Latitude: **34.959689**
Longitude: **-78.996964**

Location description: **The start of project coordinates are latitude 34.960619N and longitude -78.97795W and the end of project coordinates are latitude 34.981538N and longitude -79.04669W.**

Description of projects area and activity: **This verification authorizes the permanent conversion of 1.72 acres of wetland and temporary impacts to 6.04 acres of wetlands, 0.1, 0.12-acre of open waters, and 540 linear feet of perennial and intermittent stream channel for the purpose of installing 22,900 linear feet of 24-inch sewer pipe, 10,850 linear feet of 18" sewer pipe, 5,650 linear feet of 12" gravity sewer pipe and 8,600 linear feet of 8" gravity sewer line associated with an annexation agreement with the City of Fayetteville. Compensatory mitigation for the permanent conversion of 1.7 acres of riparian wetland will occur at a 1:1 ratio with NC DMS in HUC 03030004.**

Applicable Law(s): ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)

Authorization: **NWP 12. Utility Line Activities**

SEE ATTACHED NWP GENERAL, REGIONAL, AND/OR SPECIAL CONDITIONS

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the enclosed Conditions, your application signed and dated 5/26/2020, and the enclosed plans Sheets 1-37 dated 4/28/2020. Any violation of the attached conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order, a Class I administrative penalty, and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Resources (telephone 919-807-6300) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management **in Wilmington, NC, at (910) 796-7215.**

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact **Emily Greer at 910.251.4567or emily.c.greer@usace.army.mil**.

Corps Regulatory Official: GREER.EMILY.C.1385325300 Digitally signed by GREER.EMILY.C.1385325300 Date: 2020.07.23 23:11:53 -04'00' Date: **07/23/2020**

Expiration Date of Verification: **3/18/2022**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

Copy furnished:

Agent: **F&R, Inc.**
Alex Aycrigg
E-mail: **aaycrigg@fandr.com**

CERTIFICATE OF COMPLETION

Action ID Number: SAW-2020-00952 County: Cumberland

Permittee: City of Fayetteville PWC, Joe Glass

Project Name: Rockfish Creek Sewer Outfall Fayetteville PWC Cumberland

Date Verification Issued: 07/23/2020

Project Manager: Emily Greer

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT
Attn: Emily Greer
Wilmington Regulatory Office
U.S Army Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403
or
emily.c.greer@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. Failure to comply with any terms or conditions of this authorization may result in the Corps suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee **Date**

SPECIAL CONDITIONS
ROCKFISH CREEK SEWER OUTFALL
SAW-2020-00952

a. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

Compensatory mitigation for the permanent conversion of 1.7 acres of riparian wetland shall occur at a 1:1 ratio with NC DMS in HUC 03030004.

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TIM BAUMGARTNER
Director

NORTH CAROLINA
Environmental Quality

May 26, 2020

Joseph Glass
Fayetteville Public Works Commission
PO Box 1089
Fayetteville, NC 28302

Expiration of Acceptance: 11/26/2020

Project: Big Rockfish Creek Outfall

County: Cumberland

The purpose of this letter is to notify you that the NCDEQ Division of Mitigation Services (DMS) is willing to accept payment for compensatory mitigation for impacts associated with the above referenced project as indicated in the table below. Please note that this decision does not assure that participation in the DMS in-lieu fee mitigation program will be approved by the permit issuing agencies as mitigation for project impacts. It is the responsibility of the applicant to contact permitting agencies to determine if payment to the DMS will be approved. You must also comply with all other state, federal or local government permits, regulations or authorizations associated with the proposed activity including G.S. § 143-214.11.

This acceptance is valid for six months from the date of this letter and is not transferable. **If we have not received a copy of the issued 404 Permit/401 Certification within this time frame, this acceptance will expire.** It is the applicant's responsibility to send copies of the permits to DMS. Once DMS receives a copy of the permit(s) an invoice will be issued based on the required mitigation in that permit and payment must be made prior to conducting the authorized work. The amount of the in-lieu fee to be paid by an applicant is calculated based upon the Fee Schedule and policies listed on the DMS website.

Based on the information supplied by you in your request to use the DMS, the impacts for which you are requesting compensatory mitigation credit are summarized in the following table. The amount of mitigation required and assigned to DMS for this impact is determined by permitting agencies and bank credit availability and may exceed the impact amounts shown below.

River Basin	Impact Location (8-digit HUC)	Impact Type	Impact Quantity
Cape Fear	03030004	Riparian Wetland	Up to 1.79

Upon receipt of payment, DMS will take responsibility for providing the compensatory mitigation. The mitigation will be performed in accordance with the In-Lieu Fee Program instrument dated July 28, 2010. Thank you for your interest in the DMS in-lieu fee mitigation program. If you have any questions or need additional information, please contact Kelly Williams at (919) 707-8915.

Sincerely,

FOR James. B Stanfill
Asset Management Supervisor

cc: Alex Aycrigg, agent

Compensatory Mitigation Responsibility Transfer Form

Permittee: City of Fayetteville PWC, Joe Glass **Action ID:** SAW-2020-00952
Project Name: Rockfish Creek Sewer Outfall_Fayetteville PWC_Cumberland **County:** Cumberland

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Division of Mitigation Services (NCDMS), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements:

Permitted Impacts Requiring Mitigation* **8-digit HUC and Basin:** 03030004, Cape Fear River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
				1.7		

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements: **8-digit HUC and Basin:** 03030004, Cape Fear River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
				1.7		

Mitigation Site Debited: NC DM 03030004
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCDMS, list NCDMS. If the NCDMS acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCDMS), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name: NCDMS

Name of Sponsor's Authorized Representative: Kelly Williams

Kelly Williams — 25 August 2020

Signature of Sponsor's Authorized Representative **Date of Signature**

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions: A letter from **NC DMS**, confirming they are willing and able to accept the applicant's compensatory mitigation responsibility, dated **5/26/2020** was included with the preconstruction notification.

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. ***Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 11405 Falls of Neuse Road, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil)***. Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: Emily Greer
USACE Field Office: Wilmington Regulatory Office
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403
Email: emily.c.greer@usace.army.mil

GREER.EMILY.C.1385325300 Digitally signed by GREER.EMILY.C.1385325300
Date: 2020.07.23 23:12:18 -04'00'

USACE Project Manager Signature

07/23/2020

Date of Signature

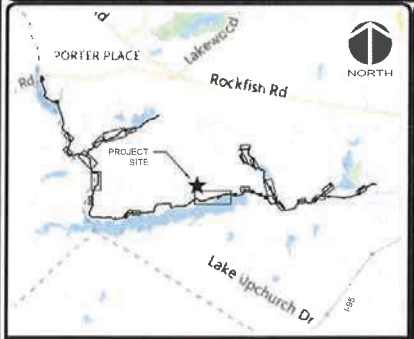
Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at http://ribits.usace.army.mil

BIG ROCKFISH CREEK OUTFALL

PROJ. NO. 01925-0005

04/28/2020

ISSUED FOR PERMIT



VICINITY MAP NOT TO SCALE

PROJECT NAME: BIG ROCKFISH CREEK OUTFALL

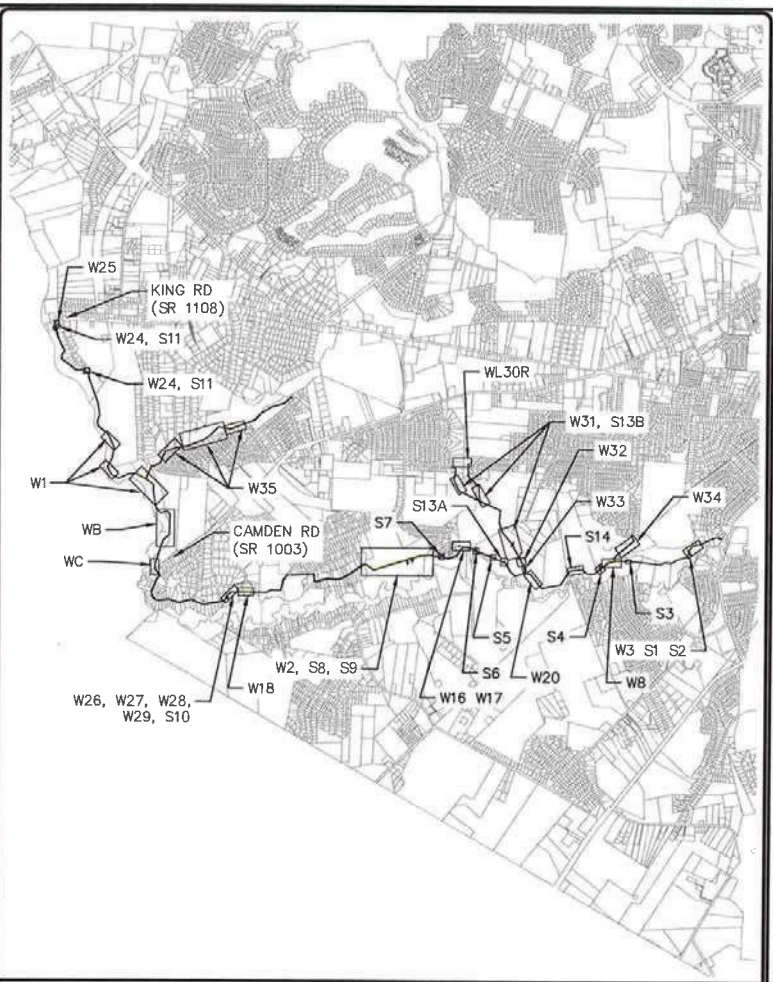
OWNER/DEVELOPER:
FAYETTEVILLE PWC
955 OLD WILMINGTON RD
FAYETTEVILLE, NC 28302
EMAIL

FAYETTEVILLE PUBLIC WORKS COMMISSION
PWC WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

McKIM & CREED
8020 Tower Point Drive
Charlotte, North Carolina 28227
Phone: (704)841-2588, Fax: (704)841-2567

NC License# F-1222
www.mckimcreed.com

PROJECT INFORMATION



SITE MAP SCALE: 1" = 3000'

SHEET INDEX

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

811 Know what's below. Call before you dig.

SHEET INDEX

BIG ROCKFISH CREEK OUTFALL
PROJ. NO. 01925-0005
SUBMITTAL DATE: 04/28/2020

WETLAND IMPACT AREA				
WETLAND	TEMPORARY IMPACT		PERMANENT IMPACT	
	SQ. FT.	ACRES	SQ. FT.	ACRES
W3	14618.25	0.3356	3822.89	0.0878
W8	10678.99	0.2452	2410.38	0.0553
W20	2425.51	0.0557	957.28	0.022
W16	5164.87	0.1186	789.58	0.0181
W17	80.1	0.0018	0	0
W2	81992.26	1.8823	21674.13	0.4976
W18	9834.10	0.2258	1995.3	0.0458
W26	1337.19	0.0307	351.9	0.0081
W27	242.01	0.0056	44.02	0.001
W28	46.29	0.0011	0	0
W29	957.2	0.022	347.38	0.008
WC	1449.2	0.0333	408.07	0.0094
WB	19172.4	0.4401	4653.12	0.1068
W1	27671.86	0.6353	4725.43	0.1085
W24	435.22	0.01	86.28	0.002
W25	861.13	0.0198	93.05	0.0021
W33	3900.76	0.0895	1194.42	0.0274
W32	4026.61	0.0924	1155.7	0.0265
W31	41262.07	0.9472	14464.5	0.3321
WL30R	7486.4	0.1719	0	0
W34	4647.28	0.1067	3216.63	0.0738
W35	38324.31	0.8798	15587.08	0.3578
TOTAL	276614.02	8.3502	77977.14	1.7901

TEMPORARY STREAM IMPACT		
STREAM	LENGTH (LF)	WIDTH (LF)
S1	52.33	6.01
S2	68.61	17.57
S4	51.87	8.67
S13A	51.77	16.26
S13B	57.09	6.86
S5	47.53	2.00
S6	49.21	2.70
S7	35.52	5.07
S8	64.67	16.77
S9	0	0
S10	33.5	5.44
S11	68.72	4.78
TOTAL	580.81	92.14

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
	STREAM IMPACTS	
STREAM "S14" – ROCKFISH CREEK	SQ FT	ACRE
ALLOWABLE TEMP.	22457.71	0.5156
ALLOWABLE PERM. (6 PIERS)	57.73	0.0013
TOTAL	22515.44	0.5169

BIG ROCKFISH CREEK OPEN WATER IMPACT		
KING'S POND	LENGTH (LF)	WIDTH (LF)
TEMPORARY	48.02	112.31
PERMANENT	0	0
TOTAL	48.02	112.31

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

NO.	DESCRIPTION	DATE
2	ISSUED FOR PERMIT	APRIL 2020

REVISIONS

McKIM&CREED
8020 Tower Point Drive
Charlotte, North Carolina 28227
Phone: (704)841-2588, Fax: (704)841-2567
NC License# P-1222
www.mckimcreed.com

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL

GENERAL

IMPACT SUMMARY TABLES

PROJ. START DATE	03/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WDR
PROJ. MGR.	BRL

SCALE: HORIZONTAL TBD, VERTICAL TBD

2

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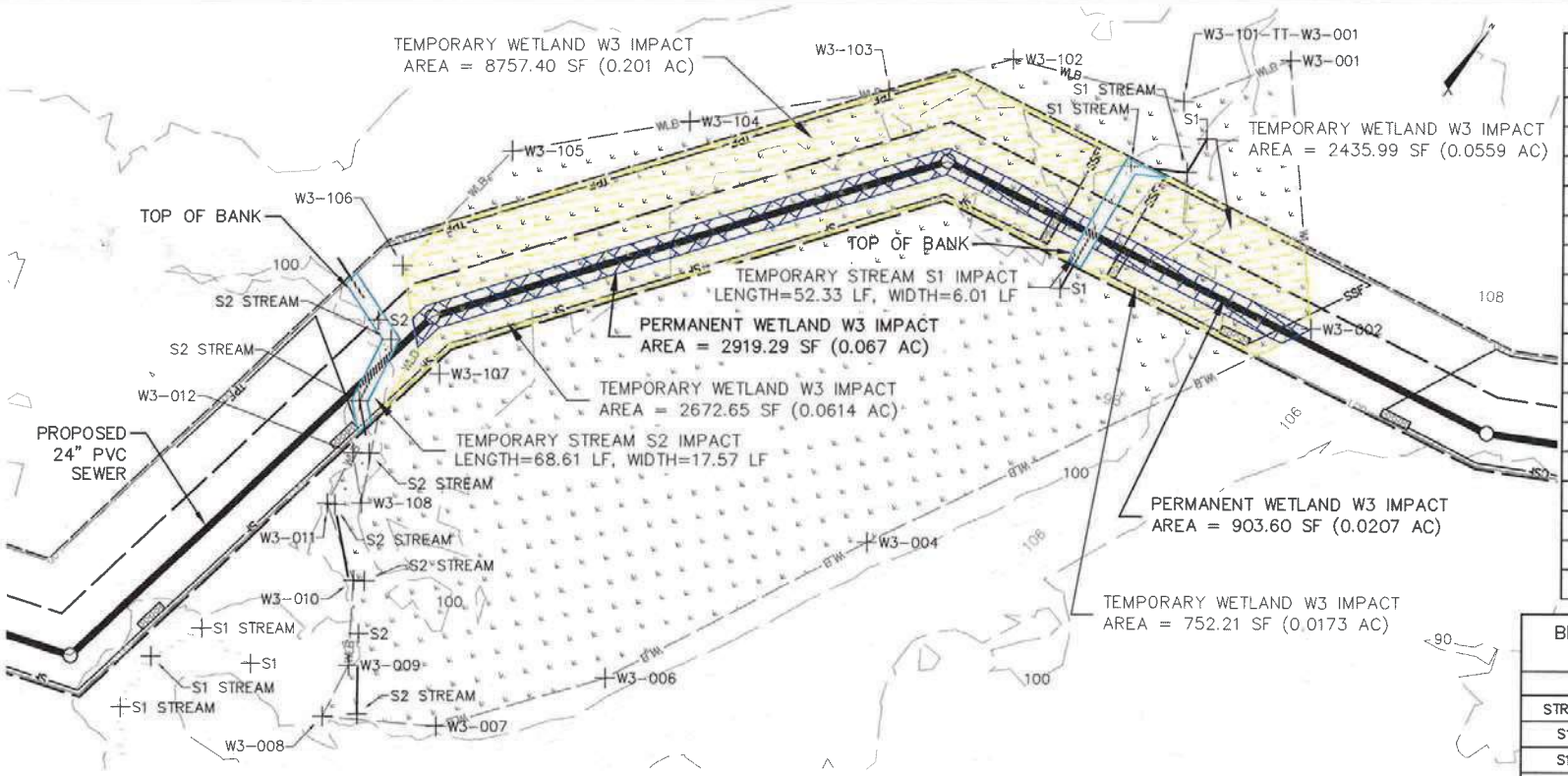
STATUS: ISSUED FOR PERMIT

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\IMPACT SUMMARY TABLES.DWG 04/21/2020 12:58:00 ANDREW BRANCH



WETLAND W3 FLAG TABLE

FLAG #	NORTHING	EASTING
W3-001	441024.90	2007404.46
W3-002	440940.46	2007474.35
W3-004	440764.88	2007375.93
W3-006	440657.81	2007320.24
W3-007	440602.15	2007275.04
W3-008	440579.30	2007234.83
W3-009	440602.29	2007231.60
W3-010	440631.84	2007213.38
W3-011	440651.48	2007186.61
W3-012	440674.25	2007183.40
W3-101-TT-W3-001	440985.96	2007378.24
W3-102	440959.87	2007311.38
W3-103	440920.01	2007277.35
W3-104	440862.75	2007217.81
W3-105	440811.48	2007165.89
W3-106	440747.91	2007156.12
W3-107	440720.45	2007193.62
W3-108	440659.40	2007197.99

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS

STREAM IMPACTS		
STREAM "S1"	LENGTH (LF)	WIDTH (LF)
S1 TEMP.	52.33	6.01
S1 PERM.	0	0
TOTAL	52.33	6.01

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS

STREAM IMPACTS		
STREAM "S2"	LENGTH (LF)	WIDTH (LF)
S2 TEMP.	68.61	17.57
S2 PERM.	0	0
TOTAL	68.61	17.57

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W3"	SQ FT	ACRE
ALLOWABLE TEMP.	14618.25	0.3356
ALLOWABLE PERM.	3822.89	0.0878
TOTAL	18441.14	0.4234

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

REVISIONS		

McKIM&CREED
8020 Tower Point Drive
Charlotte, North Carolina 28227
Phone: (704)841-2586 Fax: (704)841-2567
NC License# P-1222
www.mckimcreed.com

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W3, S1, S2

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 50', VERTICAL N/A

3

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STATUS: ISSUED FOR PERMIT

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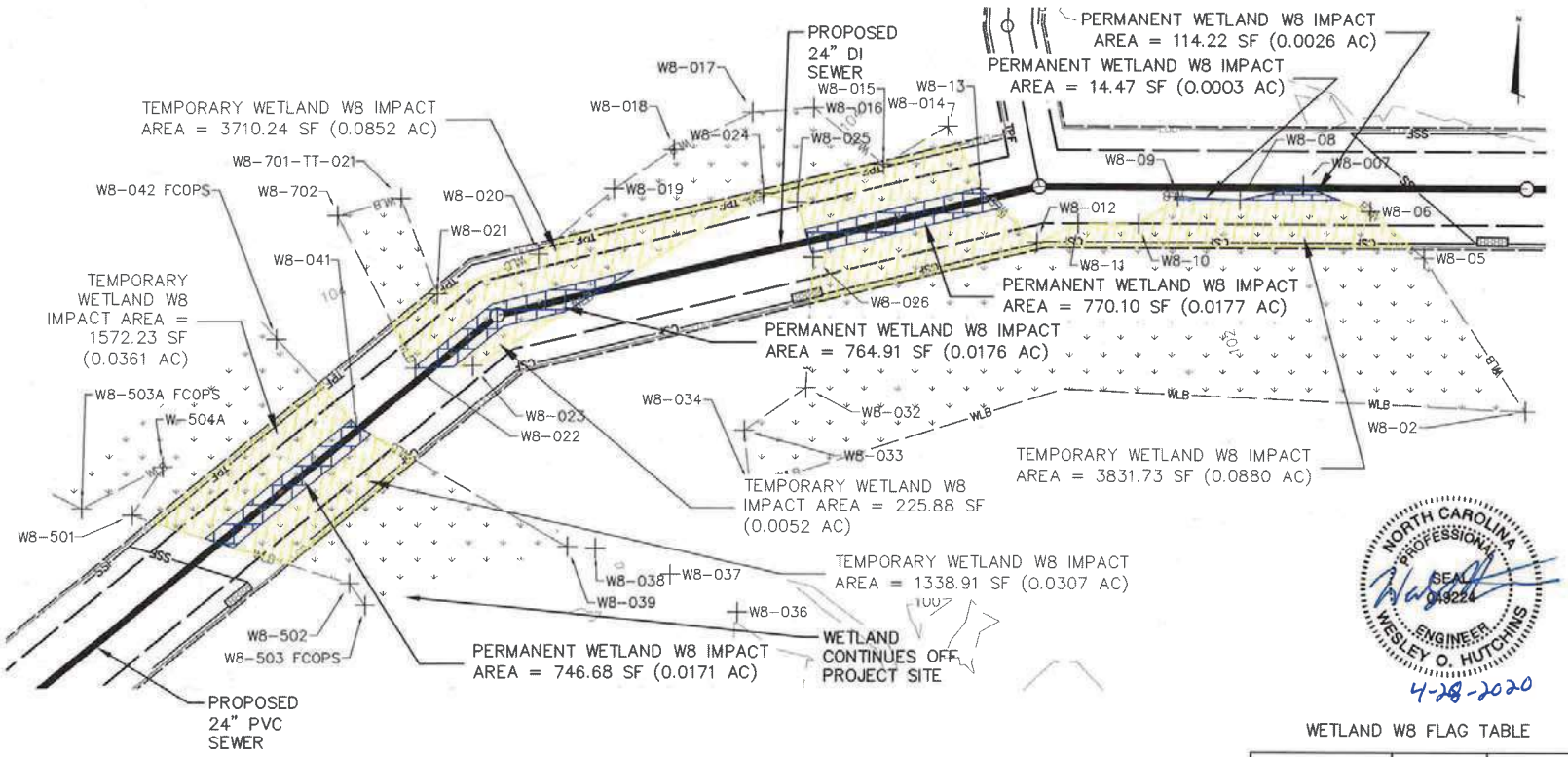

NORTH CAROLINA PROFESSIONAL SEAL 043224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

W8-10	440355.78	2004732.67
W8-11	440355.86	2004707.42
W8-012	440348.23	2004690.64
W8-13	440369.76	2004667.24
W8-014	440395.69	2004653.65
W8-015	440379.97	2004627.08
W8-016	440403.12	2004598.26
W8-017	440401.10	2004572.85
W8-018	440385.83	2004540.54
W8-019	440369.50	2004515.88
W8-020	440342.72	2004485.01
W8-021	440326.52	2004443.80
W8-022	440296.05	2004434.70
W8-023	440297.03	2004458.26
W8-024	440367.97	2004577.45
W8-025	440364.37	2004591.52
W8-026	440341.65	2004598.18
W8-032	440288.20	2004595.41
W8-033	440270.69	2004569.93
W8-034	440247.50	2004572.52
W8-036	440195.95	2004567.33
W8-037	440211.25	2004539.57
W8-038	440222.06	2004508.58
W8-039	440222.71	2004497.13
W8-041	440272.40	2004410.38

WETLAND W8 FLAG TABLE

FLAG #	NORTHING	EASTING			
W-504A	440255.65	2004330.81	W8-042 FCOPS	440307.92	2004377.58
W8-02	440279.17	2004893.08	W8-501	440235.67	2004318.07
W8-05	440341.98	2004850.99	W8-502	440207.70	2004407.58
W8-06	440361.13	2004828.46	W8-503 FCOPS	440198.58	2004414.04
W8-007	440371.54	2004800.55	W8-503A FCOPS	440238.53	2004297.41
W8-08	440365.75	2004774.62	W8-701-TT-021	440365.68	2004428.81
W8-09	440367.06	2004748.78	W8-702	440358.66	2004402.42

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIOOR)

TEMPORARY WETLANO IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF OISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLANO IMPACTS		
WETLANO "W8"	SQ FT	ACRE
ALLOWABLE TEMP.	10678.99	0.2452
ALLOWABLE PERM.	2410.38	0.0553
TOTAL	13089.37	0.3005

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

McKIM&CREED
8020 Tower Point Drive
Charlotte, North Carolina 28227
Phone: (704)841-2588, Fax: (704)841-2567
NC License# P-1222
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955 Old Wilmington Road, Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W8

SCALE: HORIZONTAL 1" = 50' VERTICAL TBD

4

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STATUS: ISSUED FOR PERMIT

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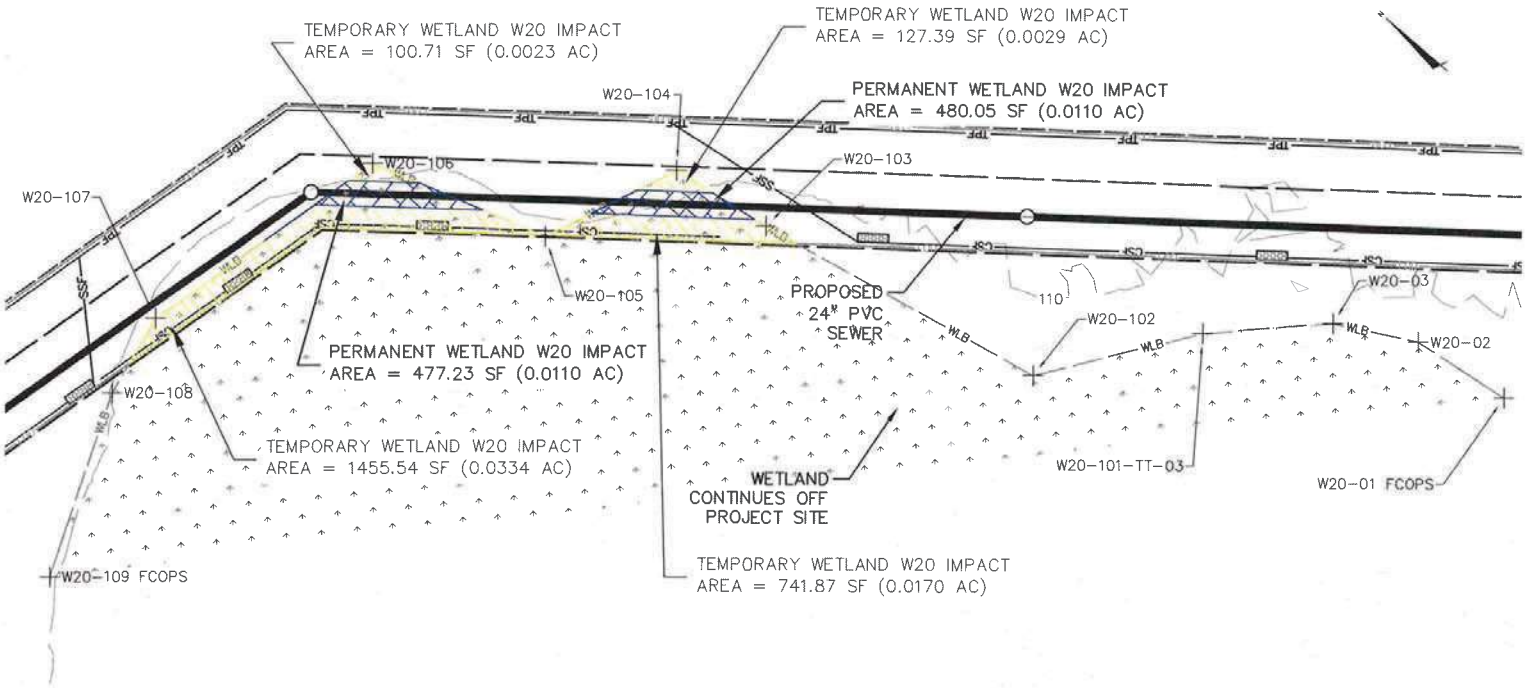

WETLAND W20 FLAG TABLE

FLAG #	NORTHING	EASTING
W20-01 FCOPS	439490.96	2002127.19
W20-02	439531.64	2002121.75
W20-03	439562.91	2002105.20
W20-101-TT-03	439600.47	2002068.18
W20-102	439641.74	2002011.30
W20-103	439762.50	2001987.29
W20-104	439804.42	2001981.18
W20-105	439827.51	2001927.21
W20-106	439898.97	2001905.30
W20-107	439925.70	2001802.29
W20-108	439919.79	2001768.08
W20-109 FCOPS	439891.65	2001695.65

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W20"	SQ FT	ACRE
ALLOWABLE TEMP.	2425.51	0.0557
ALLOWABLE PERM.	957.28	0.0220
TOTAL	3382.79	0.0777

NORTH CAROLINA PROFESSIONAL SEAL 048224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

50' 0 50' 100'
SCALE: 1"=50' (Horiz.)

McKIM&CREED
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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W20

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1"=50', VERTICAL TBD

5

0

STATUS: ISSUED FOR PERMIT

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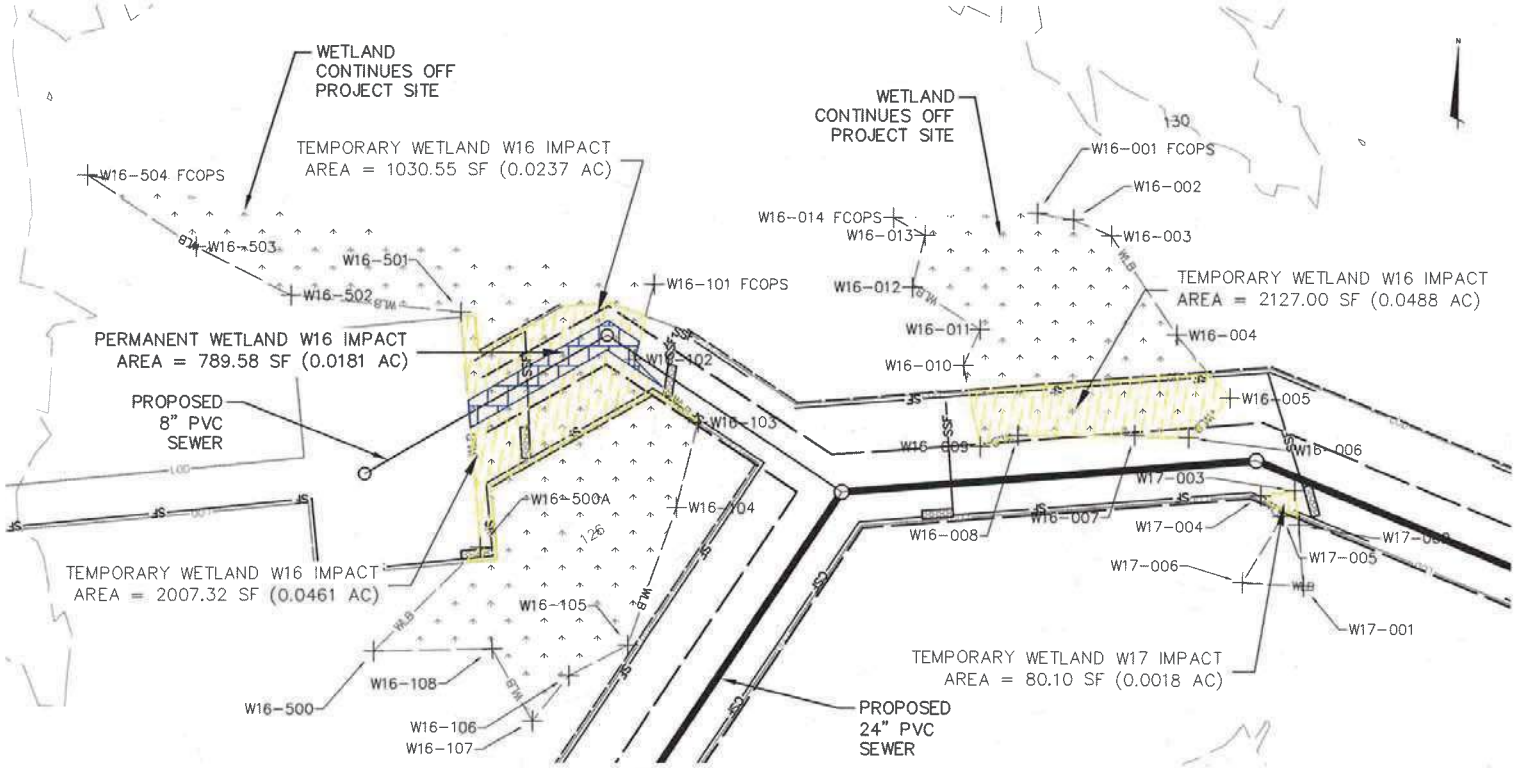

WETLAND W16 FLAG TABLE

FLAG #	NORTHING	EASTING
W16-001 FCOPS	440909.73	1999676.43
W16-002	440907.21	1999690.83
W16-003	440900.56	1999706.00
W16-004	440861.40	1999732.78
W16-005	440836.00	1999754.31
W16-006	440820.31	1999737.83
W16-007	440821.10	1999715.90
W16-008	440820.93	1999669.05
W16-009	440816.37	1999653.84
W16-010	440848.47	1999646.82
W16-011	440863.22	1999653.52
W16-012	440879.97	1999626.19
W16-013	440900.41	1999631.09
W16-014 FCOPS	440907.39	1999618.41
W16-101 FCOPS	440880.61	1999522.29
W16-102	440850.61	1999514.37
W16-103	440825.52	1999540.22
W16-104	440791.25	1999531.75
W16-105	440736.18	1999512.24
W16-106	440723.90	1999488.72
W16-107	440705.72	1999474.19
W16-108	440734.71	1999458.09
W16-500	440733.83	1999410.46
W16-500A	440775.41	1999453.25
W16-501	440869.43	1999445.27
W16-502	440876.34	1999377.40
W16-503	440895.47	1999339.02
W16-504 FCOPS	440923.94	1999295.09

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W16"	SQ FT	ACRE
ALLOWABLE TEMP.	5164.87	0.1186
ALLOWABLE PERM.	789.58	0.0181
TOTAL	5954.45	0.1367
WETLAND "W17"	SQ FT	ACRE
ALLOWABLE TEMP.	80.10	0.0018
ALLOWABLE PERM.	0	0
TOTAL	80.10	0.0018

WETLAND W17 FLAG TABLE

FLAG #	NORTHING	EASTING
W17-001	440761.25	1999784.29
W17-002	440785.64	1999782.42
W17-003	440799.47	1999780.66
W17-004	440797.29	1999767.05
W17-005	440789.12	1999776.03
W17-006	440762.15	1999759.98

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

REVISIONS

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PWC WATER RESOURCES ENGINEERING

BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W16, W17

PROJ. START DATE: 03/13/2020
MCE PROJ. # 01925-0005
DRAWN: AWB
DESIGNED: JJM
CHECKED: WOH
PROJ. MGR: BRL

SCALE
HORIZONTAL 1" = 50'
VERTICAL TBD

6
0

STATUS: ISSUED FOR PERMIT

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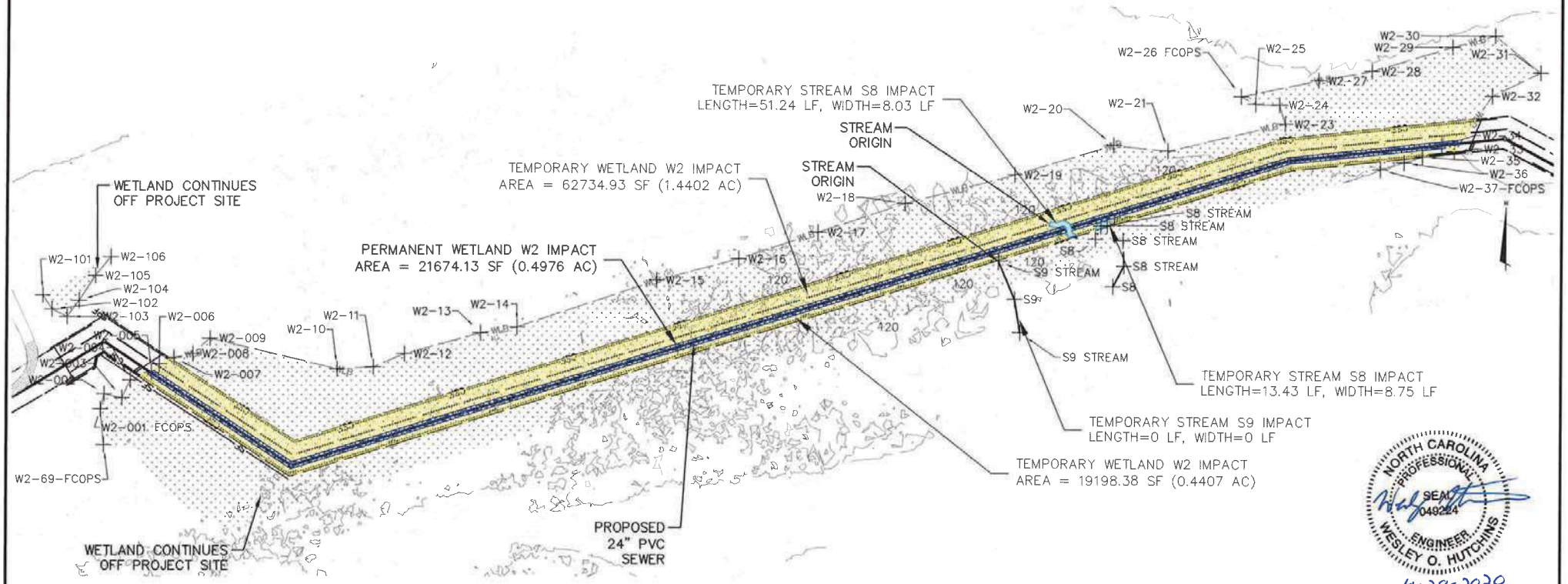

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
WETLAND IMPACTS		
WETLAND "W2"	SQ FT	ACRE
ALLOWABLE TEMP.	81992.26	1.8823
ALLOWABLE PERM.	21674.13	0.4976
TOTAL	103666.39	2.3799

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S8"	LENGTH (LF)	WIDTH (LF)
S8 TEMP.	64.67	16.77
S8 PERM.	0	0
TOTAL	64.67	16.77

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S9"	LENGTH (LF)	WIDTH (LF)
S9 TEMP.	0	0
S9 PERM.	0	0
TOTAL	0.00	0.00

150' 0 150' 300'

SCALE: 1"=150' (Horiz.)

NOTE:
WETLAND FLAG INFORMATION PROVIDED ON SHEET 8

DESCRIPTION	DATE
REVISIONS	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W2, S8, S9 (SHEET 1 OF 2)

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1"=150' VERTICAL N/S

7

0

STATUS: ISSUED FOR PERMIT

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WETLAND W2 FLAG TABLE

FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING
W2-001 FCOPS	440122.22	1996329.43	W2-21	440528.68	1997999.76	W2-42	440413.49	1998191.64	W2-103	440266.67	1996276.58
W2-002	440146.38	1996335.36	W2-23	440571.85	1998184.83	W2-53	440319.02	1997844.33	W2-104	440291.91	1996295.44
W2-003	440140.12	1996363.18	W2-24	440601.67	1998176.02	W2-54	440254.45	1997795.01	W2-105	440330.48	1996321.52
W2-004	440167.87	1996376.49	W2-25	440602.46	1998137.95	W2-55	440254.38	1997764.54	W2-106	440359.95	1996345.59
W2-005	440179.72	1996410.06	W2-26 FCOPS	440614.32	1998115.59	W2-56	440221.54	1997694.89			
W2-006	440193.16	1996421.93	W2-27	440639.63	1998237.01	W2-57	440184.55	1997625.54			
W2-007	440203.00	1996444.67	W2-28	440654.76	1998321.31	W2-58	440168.17	1997537.81			
W2-008	440209.15	1996474.26	W2-29	440692.83	1998447.89	W2-59	440145.25	1997456.37			
W2-009	440233.34	1996500.65	W2-30	440711.05	1998515.73	W2-60	440123.59	1997378.78			
W2-10	440185.10	1996699.86	W2-31	440653.33	1998587.58	W2-61	440104.84	1997287.48			
W2-11	440188.08	1996755.63	W2-32	440617.00	1998511.03	W2-62	440051.63	1997134.48			
W2-12	440208.41	1996803.88	W2-33	440530.26	1998451.02	W2-63	440020.66	1997028.49			
W2-13	440241.13	1996922.62	W2-34	440539.35	1998431.33	W2-64	439979.49	1996844.83			
W2-14	440250.57	1996979.34	W2-35	440521.80	1998401.04	W2-65	439912.51	1996728.15			
W2-15	440324.22	1997198.49	W2-36	440512.28	1998372.70	W2-66	439883.36	1996621.74			
W2-16	440358.31	1997327.25	W2-37-FCOPS	440501.53	1998335.17	W2-67	439985.57	1996434.72			
W2-17	440400.12	1997451.29	W2-38	440494.91	1998320.86	W2-68	440061.00	1996378.54			
W2-18	440445.57	1997587.92	W2-39	440483.94	1998285.91	W2-69-FCOPS	440066.88	1996334.81			
W2-19	440490.65	1997759.44	W2-40	440473.00	1998241.57	W2-101	440300.59	1996238.23			
W2-20	440537.16	1997914.49	W2-41	440438.17	1998226.23	W2-102	440278.42	1996252.83			

NOTE:
WETLAND IMPACTS SHOWN ON SHEET 7

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

REVISIONS			
NO.	DESCRIPTION	DATE	APPR.
0	ISSUED FOR PERMIT	04/21/2020	

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855 Old Wilmington Road, Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W2, S8, S9 (SHEET 2 OF 2)

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL TBD
VERTICAL TBD

8

0

STATUS
ISSUED FOR PERMIT

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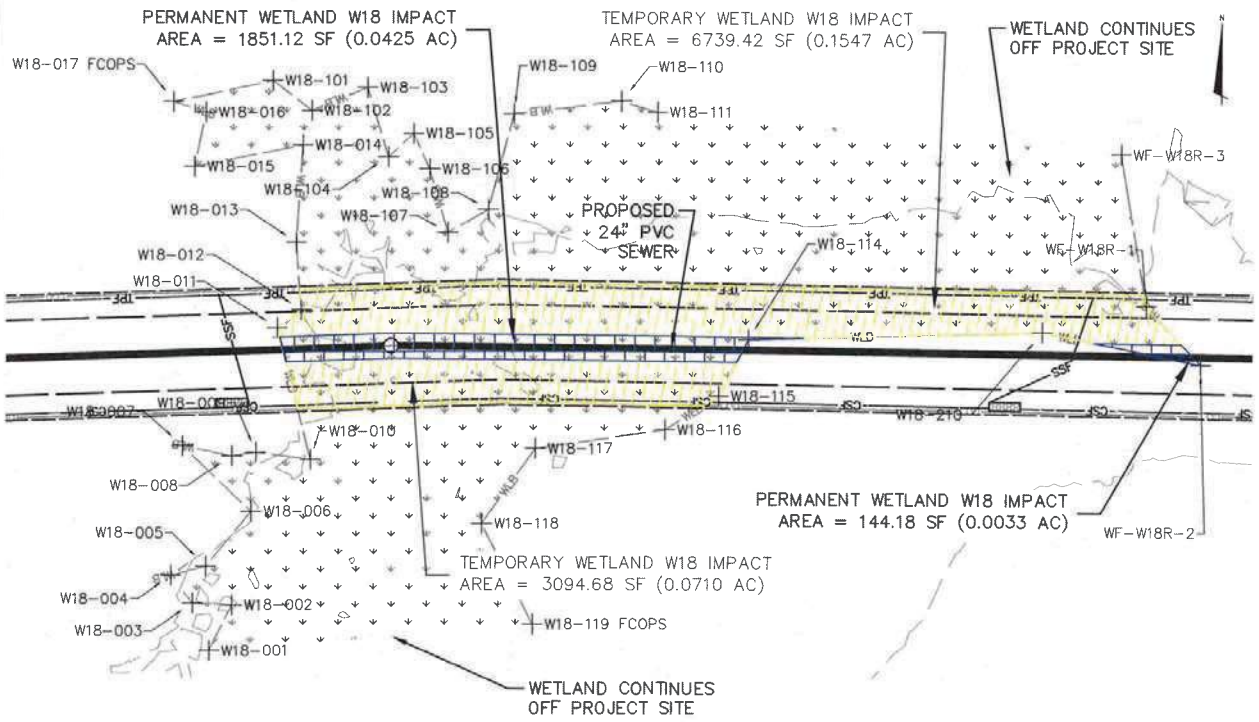

WETLAND W18 FLAG TABLE

WETLAND FLAG TABLE			WETLAND FLAG TABLE		
FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING
W18-001	439152.38	1992186.24	W18-104	439349.82	1992257.80
W18-002	439170.72	1992195.26	W18-105	439359.16	1992267.87
W18-003	439171.48	1992179.78	W18-106	439344.91	1992274.24
W18-004	439182.56	1992171.10	W18-107	439319.64	1992281.51
W18-005	439186.17	1992184.94	W18-108	439328.69	1992297.54
W18-006	439208.22	1992202.84	W18-109	439366.92	1992307.55
W18-007	439234.49	1992175.69	W18-110	439372.07	1992350.28
W18-008	439230.46	1992195.15	W18-111	439367.66	1992364.65
W18-009	439231.90	1992204.79	W18-114	439276.90	1992401.66
W18-010	439229.03	1992226.79	W18-115	439254.38	1992389.83
W18-011	439281.71	1992213.14	W18-116	439240.75	1992368.40
W18-012	439288.88	1992222.83	W18-117	439233.27	1992316.63
W18-013	439315.66	1992220.87	W18-118	439203.16	1992295.17
W18-014	439354.66	1992223.50	W18-119 FCOPS	439162.83	1992315.64
W18-015	439346.18	1992180.19	W18-210	439280.43	1992519.99
W18-016	439367.86	1992184.71	WF-W18R-1	439290.98	1992561.85
W18-017 FCOPS	439372.03	1992171.69	WF-W18R-2	439267.64	1992583.90
W18-101	439380.48	1992211.24	WF-W18R-3	439351.48	1992551.33
W18-102	439368.39	1992227.10			
W18-103	439377.62	1992249.58			

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
WETLAND IMPACTS		
WETLAND "W18"	SQ FT	ACRE
ALLOWABLE TEMP.	9834.10	0.2258
ALLOWABLE PERM.	1995.30	0.0458
TOTAL	11829.40	0.2716

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

DESCRIPTION	DATE

REVISIONS

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W18

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925.0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL 1" = 50'
VERTICAL 1:50

9
0

STATUS
ISSUED FOR PERMIT

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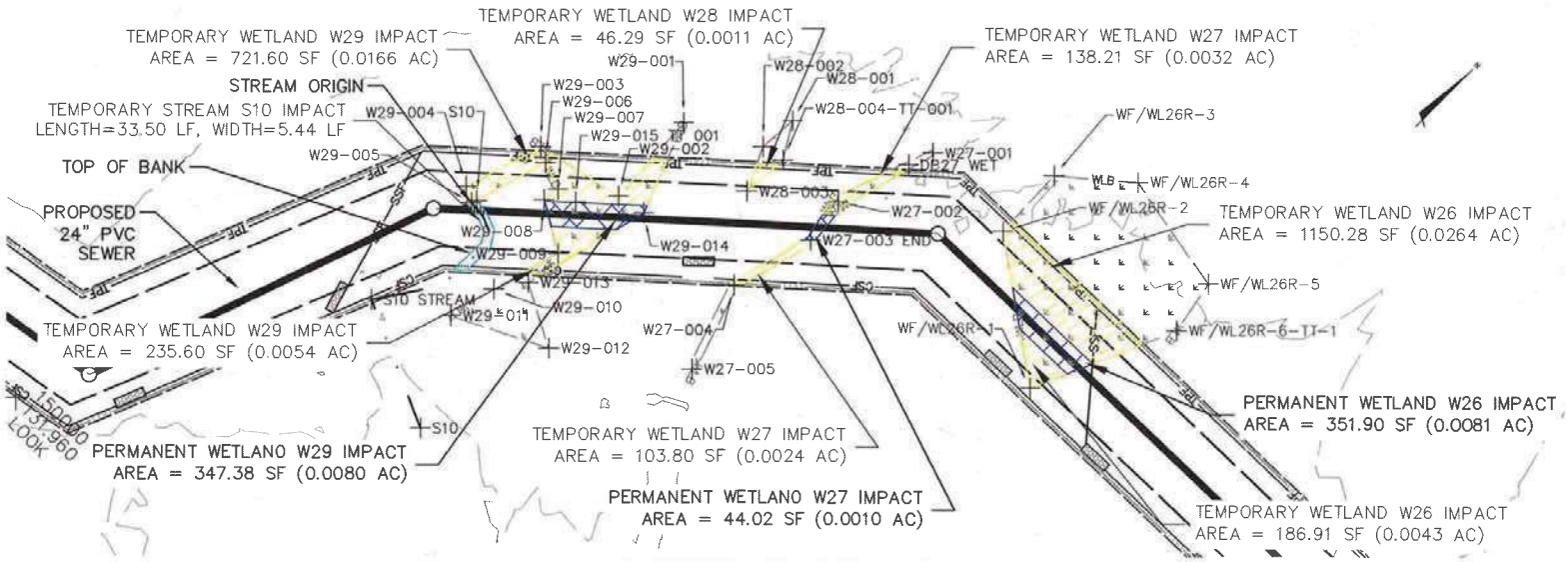

WETLAND W27 FLAG TABLE

FLAG #	NORTHING	EASTING
DP27 WET	439272.09	1991824.89
W27-001	439282.33	1991828.21
W27-002	439241.54	1991815.30
W27-003 ENO	439222.88	1991818.39
W27-004	439188.35	1991809.32
W27-005	439152.82	1991821.20

WETLAND W28 FLAG TABLE

FLAG #	NORTHING	EASTING
W28-001	439251.38	1991779.46
W28-002	439235.63	1991778.22
W28-003	439218.39	1991786.39
W28-004-TT-001	439237.57	1991787.82

WETLAND W29 FLAG TABLE

FLAG #	NORTHING	EASTING
W29-001	439219.88	1991749.11
W29-002	439180.50	1991751.31
W29-003	439172.58	1991715.17
W29-004	439140.28	1991705.32
W29-005	439137.14	1991711.50
W29-006	439169.30	1991721.01
W29-007	439165.31	1991732.16
W29-008	439158.48	1991731.19
W29-009	439147.28	1991750.36
W29-010	439118.99	1991742.20
W29-011	439099.37	1991737.55
W29-012	439117.91	1991774.51
W29-013	439130.68	1991750.14
W29-014	439183.09	1991763.27
W29-015 TT 001	439166.77	1991740.71

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W26"	SQ FT	ACRE
ALLOWABLE TEMP.	1337.19	0.0307
ALLOWABLE PERM.	351.90	0.0081
TOTAL	1689.09	0.0388
WETLAND "W27"	SQ FT	ACRE
ALLOWABLE TEMP.	242.01	0.0056
ALLOWABLE PERM.	44.02	0.0010
TOTAL	286.03	0.0066
WETLAND "W28"	SQ FT	ACRE
ALLOWABLE TEMP.	46.29	0.0011
ALLOWABLE PERM.	0	0
TOTAL	46.29	0.0011
WETLAND "W29"	SQ FT	ACRE
ALLOWABLE TEMP.	957.20	0.0220
ALLOWABLE PERM.	347.38	0.0080
TOTAL	1304.58	0.0299

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS

STREAM IMPACTS		
STREAM "S10"	LENGTH (LF)	WIDTH (LF)
S10 TEMP.	33.50	5.44
S10 PERM.	0	0
TOTAL	33.50	5.44

WETLAND W26 FLAG TABLE

FLAG #	NORTHING	EASTING
WF/WL26R-1	439244.00	1991922.65
WF/WL26R-2	439280.19	1991870.44
WF/WL26R-3	439310.62	1991869.26
WF/WL26R-4	439332.39	1991894.83
WF/WL26R-5	439324.09	1991943.68
WF/WL26R-6-TT-1	439301.96	1991947.85

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

REVISIONS			
NO.	DESCRIPTION	DATE	APPR. BY

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W26, W27, W28, W29, S10

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	AJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 50', VERTICAL TBD

SHEET NUMBER 10

REVISION 0

STATUS: ISSUED FOR PERMIT

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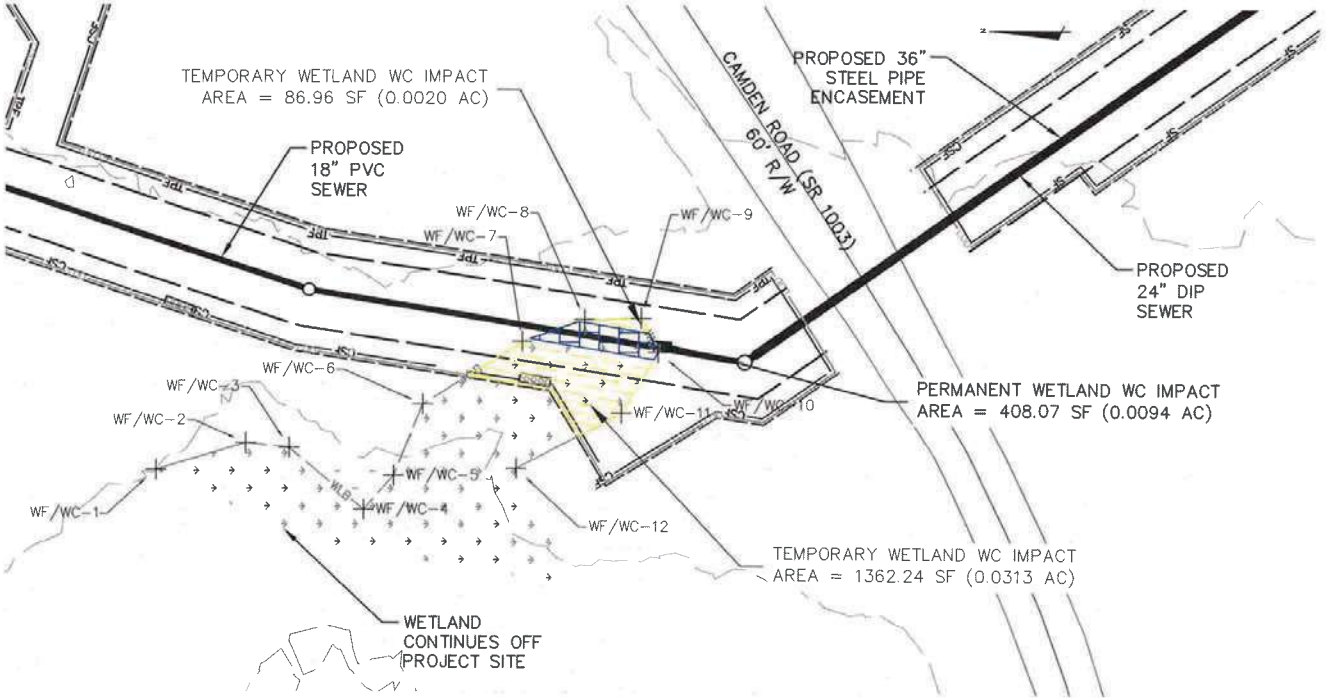

WETLAND WC FLAG TABLE

FLAG #	NORTHING	EASTING
WF/WC-1	440296.90	1989268.87
WF/WC-2	440261.28	1989279.44
WF/WC-3	440243.95	1989277.59
WF/WC-4	440214.11	1989252.78
WF/WC-5	440202.14	1989266.47
WF/WC-6	440190.70	1989294.90
WF/WC-7	440150.92	1989320.28
WF/WC-8	440125.89	1989329.13
WF/WC-9	440102.99	1989329.78
WF/WC-10	440096.20	1989316.14
WF/WC-11	440110.75	1989291.70
WF/WC-12	440153.07	1989269.45

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "WC"	SQ FT	ACRE
ALLOWABLE TEMP.	1449.20	0.0333
ALLOWABLE PERM.	408.07	0.0094
TOTAL	1857.27	0.0426

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

REVISIONS

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

WC

PROJ. START DATE 03/12/2020
MCE PROJ. # 01925-0005
DRAWN AWB
DESIGNED JJM
CHECKED WDH
PROJ. MGR. BWL

SCALE
HORIZONTAL TBD
VERTICAL TBD

11

0

STATUS ISSUED FOR PERMIT

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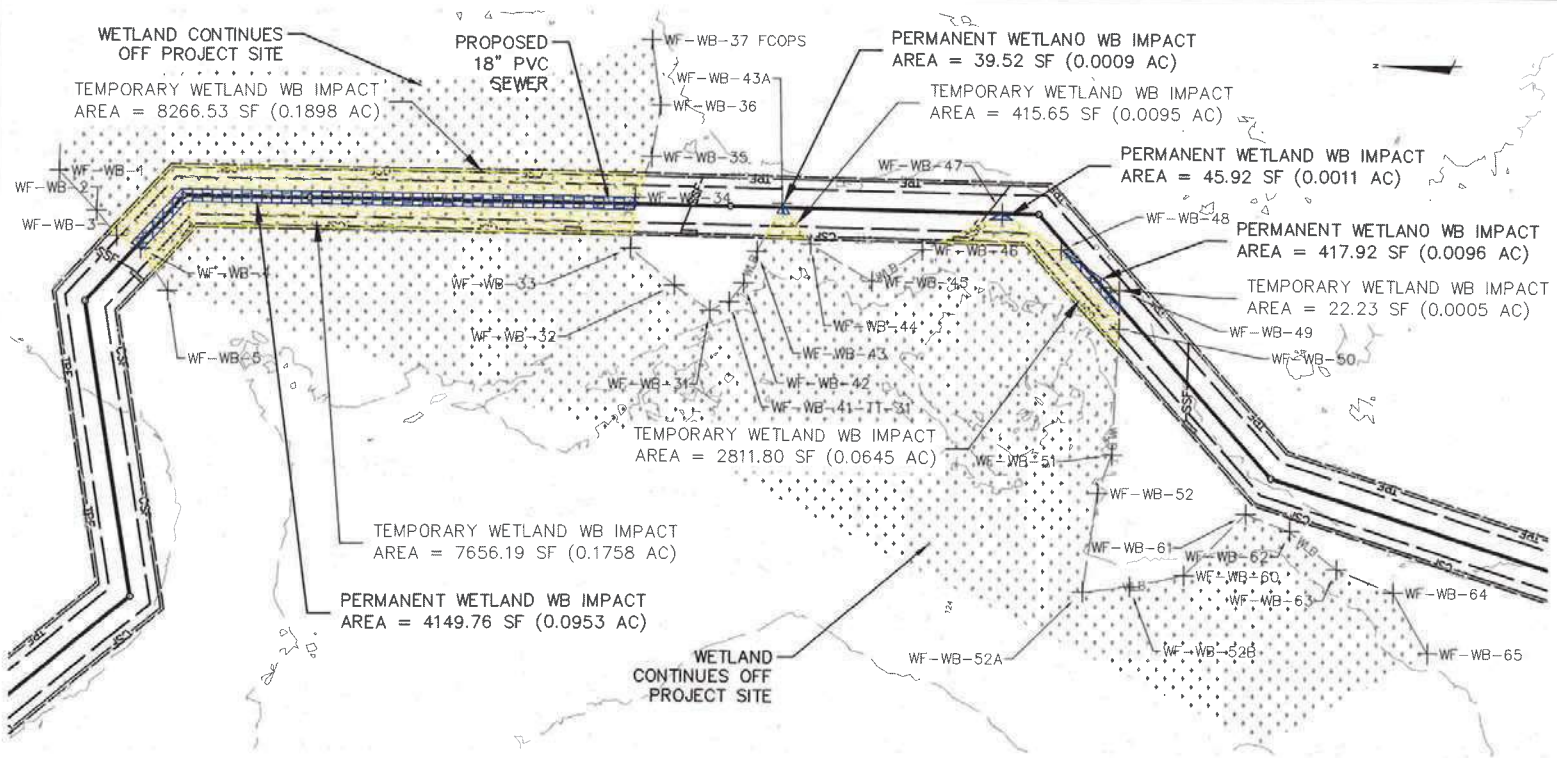

WETLAND WB FLAG TABLE

FLAG #	NORTHING	EASTING
WF-W8-1	441962.51	1989826.17
WF-W8-2	441932.44	1989794.08
WF-W8-3	441916.56	1989774.20
WF-W8-4	441897.54	1989763.99
WF-W8-5	441875.93	1989730.23
WF-WB-31	441442.36	1989715.05
WF-W8-32	441470.85	1989734.94
WF-W8-33	441506.52	1989764.31
WF-WB-34	441503.08	1989804.85
WF-W8-35	441490.16	1989837.46
WF-W8-36	441483.04	1989878.77
WF-W8-37 FCOPS	441490.32	1989931.48
WF-W8-41-TT-31	441426.63	1989722.09
WF-W8-42	441415.23	1989736.91
WF-W8-43	441404.87	1989762.44
WF-W8-43A	441384.98	1989800.53
WF-W8-44	441361.64	1989768.43
WF-W8-45	441312.08	1989739.10
WF-W8-46	441271.72	1989764.51
WF-W8-47	441207.91	1989794.25
WF-W8-48	441159.73	1989765.61
WF-W8-49	441113.12	1989733.61
WF-W8-50	441112.83	1989702.96
WF-W8-51	441117.63	1989602.09
WF-W8-52	441128.64	1989571.60
WF-W8-52A	441140.06	1989492.44
WF-W8-528	441102.61	1989496.71
WF-W8-60	441059.11	1989506.05
WF-W8-61	441009.17	1989555.61
WF-W8-62	440973.53	1989542.00
WF-W8-63	440935.89	1989511.84
WF-W8-64	440890.45	1989493.73
WF-W8-65	440861.98	1989445.27

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS 4-28-2020

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "WB"	SQ FT	ACRE
ALLOWABLE TEMP.	19172.40	0.4401
ALLOWABLE PERM.	4653.12	0.1068
TOTAL	23825.52	0.5470

100' 0 100' 200'

SCALE: 1"=100' (Horiz.)

REVISIONS			
NO.	DESCRIPTION	DATE	
1	ISSUED FOR PERMIT	APR. 2020	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

WB

PROJ. START DATE	03/12/2020
MCK PROJ. #	01925-0005
DRAWN	AHS
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR.	BRL

SCALE: HORIZONTAL TBD, VERTICAL TBD

12

0 REVISION

STATUS: ISSUED FOR PERMIT

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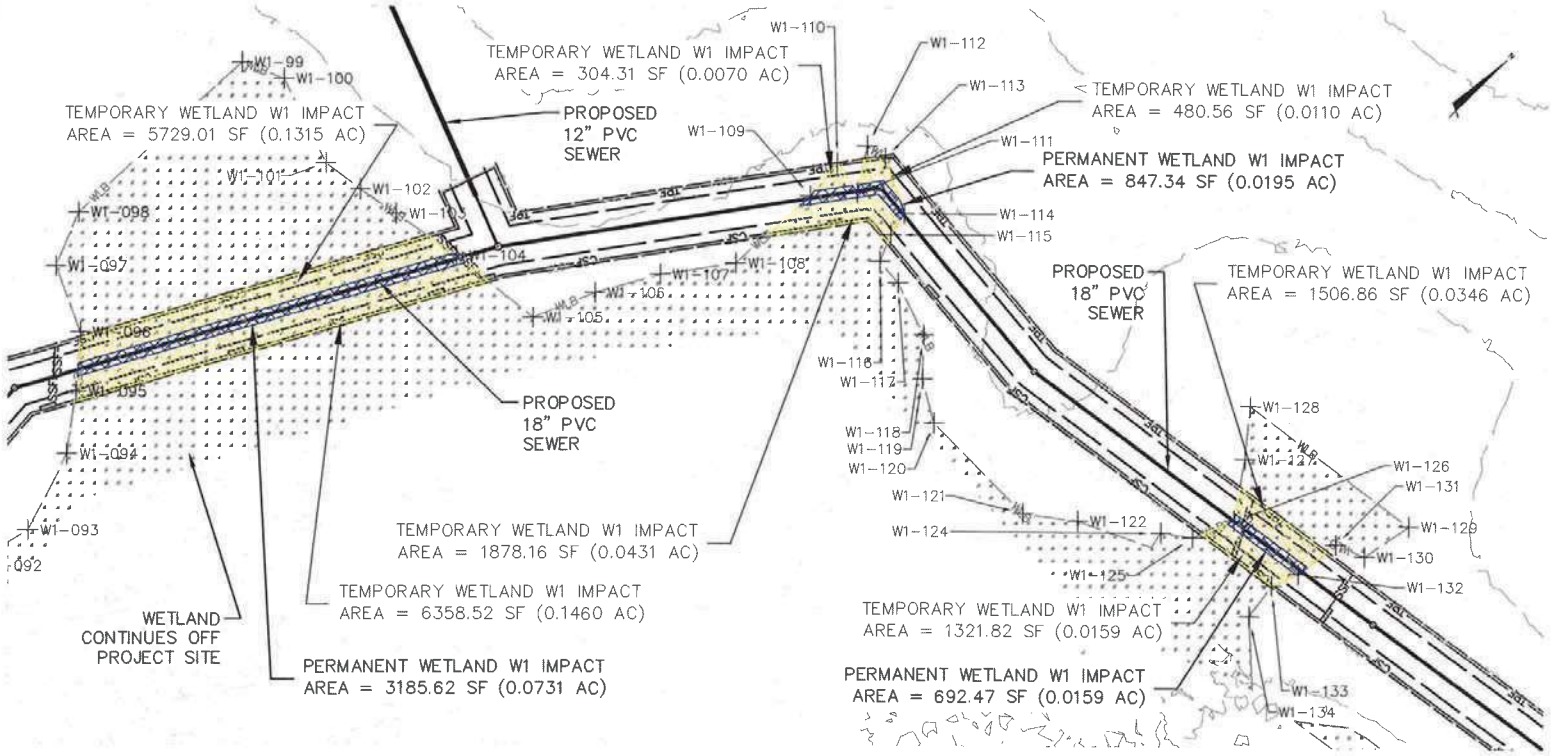

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 16 FOR WETLAND "W1"
FLAG POINTS AND TOTAL IMPACTS

100' 0 100' 200'

SCALE: 1"=100' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

REVISIONS			
NO.	DESCRIPTION	DATE	APPR.
0	ISSUED FOR PERMIT	4/28/2020	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W1 (SHEET 1 OF 4)

PROJ. START DATE	5/15/2020
MCE PROJ #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL TBD
VERTICAL TBD

13

0

STATUS: ISSUED FOR PERMIT

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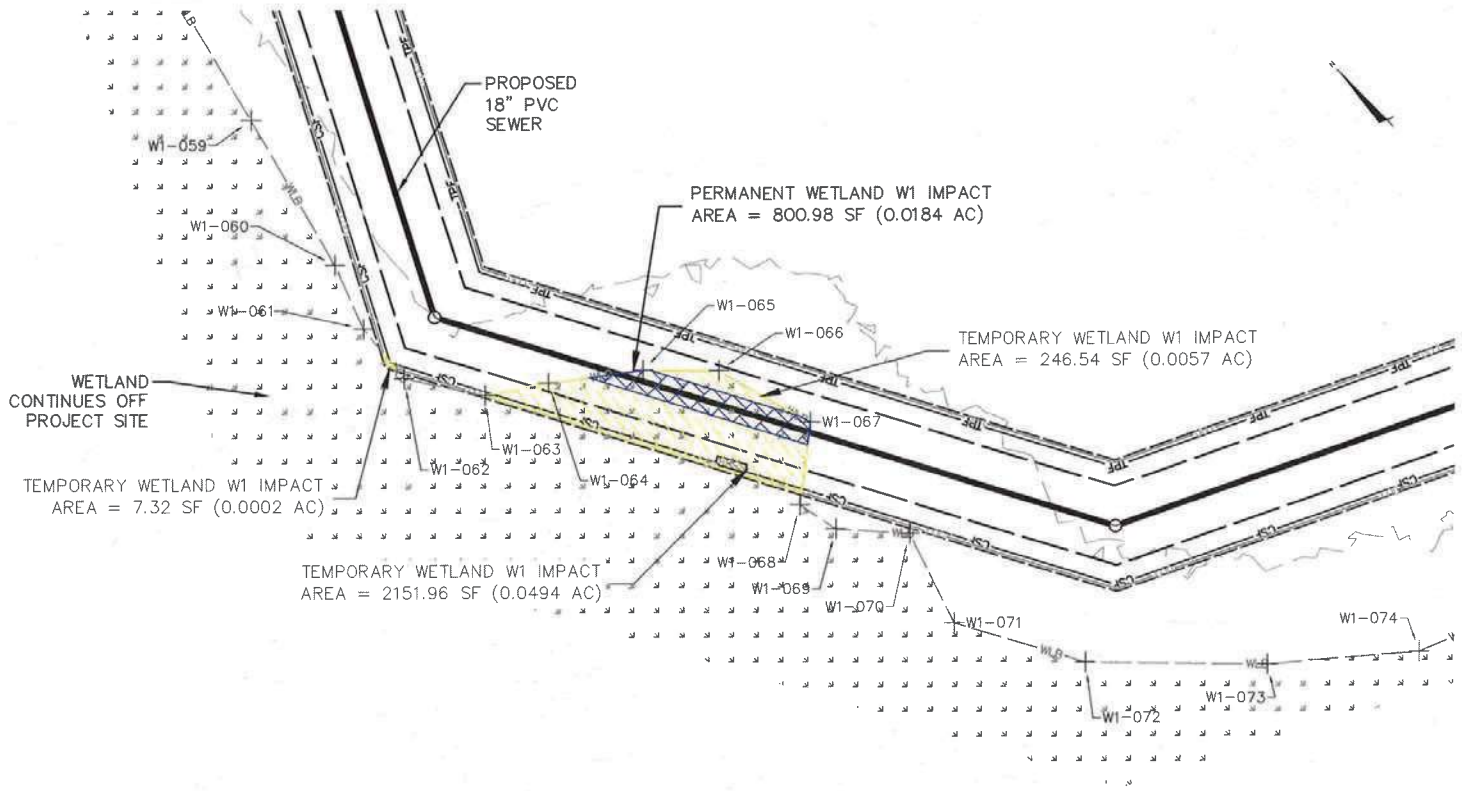

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 16 FOR WETLAND "W1"
FLAG POINTS AND TOTAL IMPACTS

50' 0 50' 100'
SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

DESIGNED	
DRAWN	
CHECKED	
SUBMITTED	

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BIG ROCKFISH CREEK OUTFALL

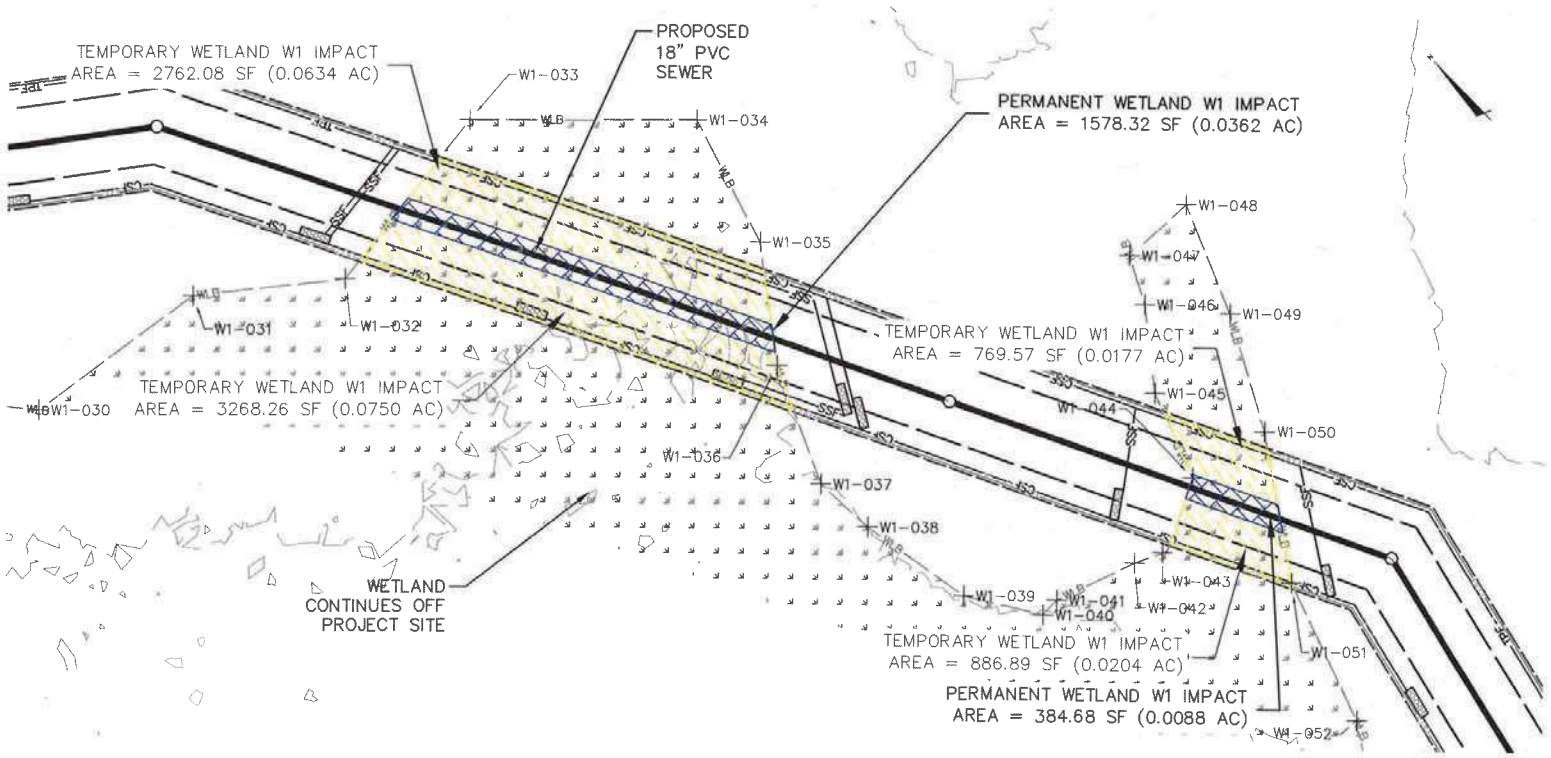
WETLAND & STREAM IMPACTS
W1 (SHEET 2 OF 4)

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WDH
PROJ. MGR	BRL

SCALE
HORIZONTAL 1" = 50'
VERTICAL TBD

14
COMMISSIONED
0
REVISIONS

STATUS
ISSUED FOR PERMIT



PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 16 FOR WETLAND "W1" FLAG POINTS AND TOTAL IMPACTS

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W1 (SHEET 3 OF 4)

PROJ. START DATE	01/12/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL 1" = 50'
VERTICAL TBD

15
0

STATUS
ISSUED FOR PERMIT

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WETLAND W1 FLAG TABLE

FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING
W1-001	445704.18	1987201.54	W1-021	444920.22	1987318.42	W1-041	444152.47	1987846.39	W1-061	443435.70	1987701.89	W1-081	442950.65	1988106.52	W1-101	443166.94	1988964.95	W1-121	442573.95	1989164.19
W1-002	445674.32	1987243.14	W1-022	444837.85	1987327.18	W1-042	444141.13	1987879.05	W1-062	443410.08	1987699.41	W1-082	442986.97	1988126.99	W1-102	443132.00	1988969.89	W1-122	442538.52	1989191.56
W1-003	445633.85	1987269.40	W1-023	444785.66	1987354.71	W1-043	444136.22	1987890.17	W1-063	443382.38	1987717.55	W1-083	443017.48	1988144.74	W1-103	443098.07	1988976.37	W1-123	442481.80	1989219.08
W1-004	445609.43	1987295.70	W1-024	444743.02	1987353.87	W1-044	444149.11	1987919.87	W1-064	443367.79	1987738.94	W1-084	443039.11	1988177.68	W1-104	443040.46	1988986.44	W1-124	442484.48	1989232.80
W1-005	445584.42	1987343.51	W1-025	444707.50	1987398.87	W1-045	444184.11	1987932.55	W1-065	443344.27	1987769.62	W1-085	443029.72	1988228.58	W1-105	442962.38	1988994.83	W1-125	442463.62	1989248.09
W1-006	445549.41	1987338.37	W1-026	444706.67	1987432.28	W1-046	444212.36	1987954.30	W1-066	443322.48	1987790.98	W1-086	443029.45	1988271.24	W1-106	442941.29	1989043.82	W1-126	442450.14	1989281.24
W1-007	445514.06	1987347.61	W1-027	444651.85	1987474.21	W1-047	444230.70	1987963.54	W1-067	443281.80	1987802.36	W1-087	443047.07	1988295.43	W1-107	442915.19	1989090.86	W1-127	442478.98	1989322.27
W1-008	445473.27	1987334.59	W1-028	444601.47	1987513.01	W1-048	444229.10	1987994.02	W1-068	443261.40	1987776.12	W1-088	443076.74	1988325.21	W1-108	442878.86	1989140.29	W1-128	442506.11	1989354.83
W1-009	445412.72	1987352.03	W1-029	444560.94	1987553.33	W1-049	444185.70	1987976.37	W1-069	443244.43	1987779.48	W1-089	443103.00	1988343.15	W1-109	442874.81	1989220.50	W1-129	442347.73	1989378.12
W1-010	445346.19	1987346.53	W1-030	444493.60	1987609.09	W1-050	444142.28	1987953.32	W1-070	443222.06	1987799.16	W1-090	443148.45	1988415.56	W1-110	442878.24	1989254.51	W1-130	442355.66	1989335.92
W1-011	445315.90	1987360.07	W1-031	444482.14	1987685.49	W1-051	444091.35	1987918.85	W1-071	443183.86	1987786.29	W1-091	443166.42	1988467.70	W1-111	442849.98	1989249.28	W1-131	442378.82	1989326.08
W1-012	445263.70	1987380.60	W1-032	444444.11	1987732.98	W1-052	444033.38	1987899.23	W1-072	443135.50	1987812.48	W1-092	443140.00	1988535.75	W1-112	442871.05	1989281.60	W1-132	442383.55	1989288.06
W1-013	445228.39	1987394.25	W1-033	444454.57	1987812.53	W1-053	443958.84	1987852.39	W1-073	443082.92	1987863.66	W1-093	443127.85	1988588.14	W1-113	442854.31	1989284.98	W1-133	442391.95	1989266.07
W1-014	445183.58	1987400.75	W1-034	444391.11	1987876.72	W1-054	443880.59	1987824.02	W1-074	443042.62	1987910.50	W1-094	443148.79	1988653.74	W1-114	442811.97	1989264.54	W1-134	442386.94	1989236.15
W1-015	445176.28	1987386.94	W1-035	444338.40	1987860.72	W1-055	443858.63	1987812.58	W1-075	443023.56	1987956.87	W1-095	443179.01	1988694.32	W1-115	442807.37	1989244.84			
W1-016	445122.35	1987376.44	W1-036	444298.32	1987831.29	W1-056	443763.71	1987786.94	W1-076	443003.92	1987989.30	W1-096	443210.00	1988730.10	W1-116	442798.26	1989223.84			
W1-017	445090.47	1987363.07	W1-037	444252.07	1987811.01	W1-057	443700.84	1987808.07	W1-077	442990.67	1988008.76	W1-097	443261.72	1988753.50	W1-117	442775.88	1989222.09			
W1-018	445037.91	1987384.99	W1-038	444226.62	1987812.45	W1-058	443621.04	1987752.15	W1-078	442988.37	1988025.09	W1-098	443279.15	1988796.54	W1-118	442731.68	1989207.89			
W1-019	445015.36	1987366.03	W1-039	444179.77	1987820.97	W1-059	443526.70	1987728.96	W1-079	442964.26	1988043.34	W1-99	443271.52	1988974.35	W1-119	442707.28	1989182.50			
W1-020	444985.47	1987333.42	W1-040	444152.13	1987838.35	W1-060	443462.01	1987711.53	W1-080	442941.48	1988071.38	W1-100	443238.46	1988988.83	W1-120	442675.51	1989164.32			

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
WETLAND IMPACTS		
WETLAND "W1"	SQ FT	ACRE
ALLOWABLE TEMP.	27671.86	0.6353
ALLOWABLE PERM.	7489.41	0.1719
TOTAL	35161.27	0.8072

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

DESCRIPTION	DATE
ISSUED FOR PERMIT	APRIL 2020

REVISIONS

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W1 (SHEET 4 OF 4)

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL TBD, VERTICAL TBD

16

0

STATUS: ISSUED FOR PERMIT

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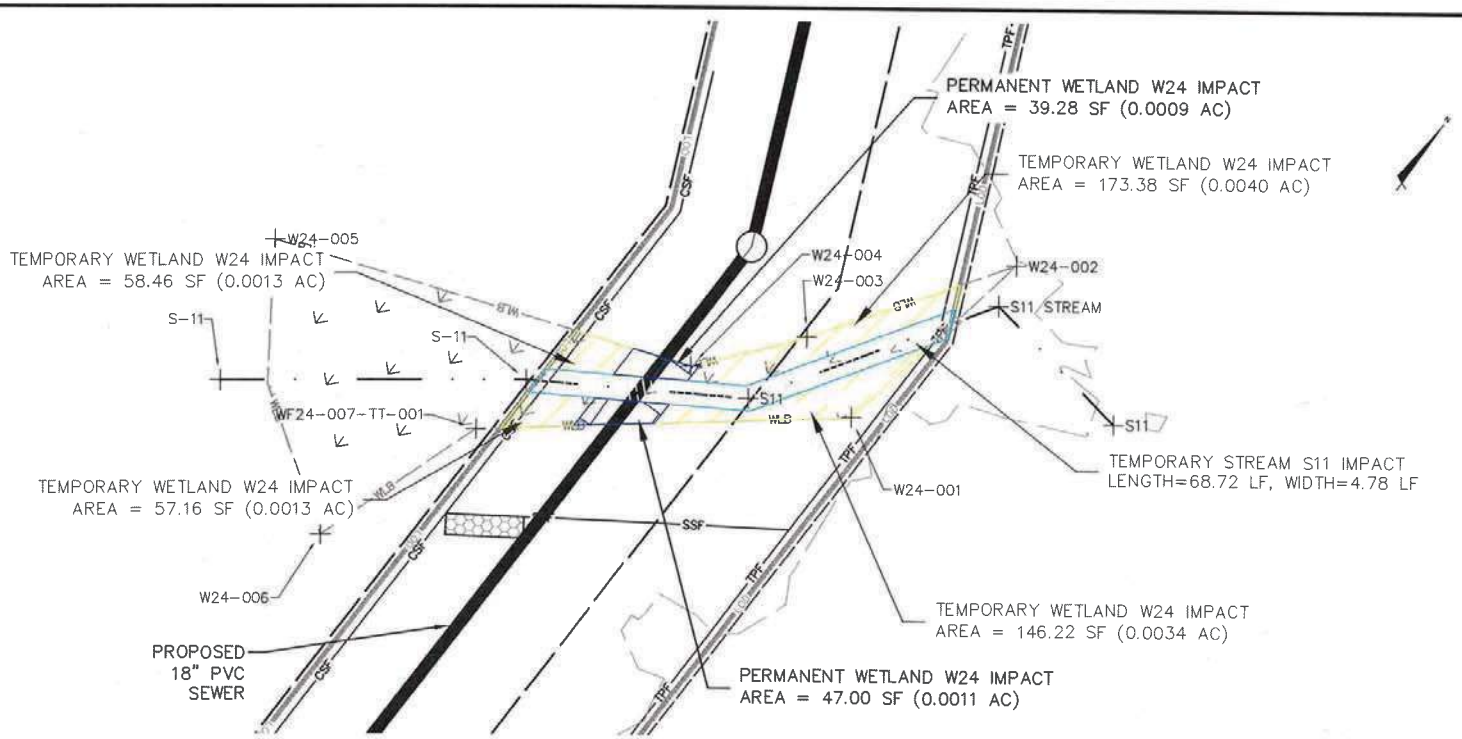

WETLAND W24 FLAG TABLE

FLAG #	NORTHING	EASTING
W24-001	448081.44	1986037.60
W24-002	448116.58	1986045.12
W24-003	448087.73	1986024.32
W24-004	448073.07	1986011.75
W24-005	448051.37	1985945.83
W24-006	448017.05	1985978.97
WF24-007-TT-001	448045.04	1985989.47

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LOD — LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W24"	SQ FT	ACRE
ALLOWABLE TEMP.	435.22	0.0100
ALLOWABLE PERM.	86.28	0.0020
TOTAL	521.50	0.0120

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS

STREAM IMPACTS		
STREAM "S11"	LENGTH (LF)	WIDTH (LF)
S11 TEMP.	68.72	4.78
S11 PERM.	0	0
TOTAL	68.72	4.78

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

20' 0 20' 40'

SCALE: 1"=20' (Horiz.)

NO.	DESCRIPTION	DATE
1	ADDITIONAL PERMITS	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W24, S11

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JAH
CHECKED	WOH
PROJ. MGR.	BWL

SCALE: HORIZONTAL 1" = 20', VERTICAL TBD

DRAWING NUMBER: 17

REVISION: 0

STATUS: ISSUED FOR PERMIT

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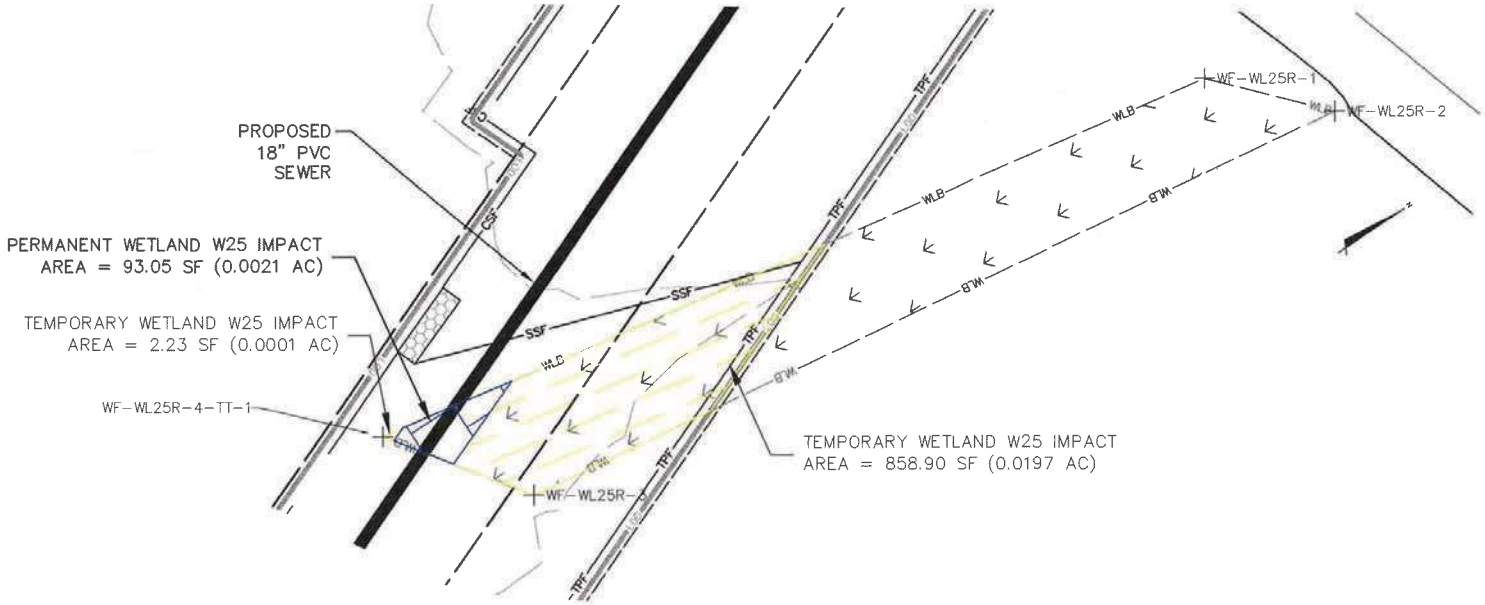

WETLAND W25 FLAG TABLE

FLAG #	NORTHING	EASTING
WF-WL25R-1	448273.87	1986010.05
WF-WL25R-2	448288.43	1986025.81
WF-WL25R-3	448147.00	1986006.91
WF-WL25R-4-TT-1	448131.97	1985985.91

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W25"	SQ FT	ACRE
ALLOWABLE TEMP.	861.13	0.0198
ALLOWABLE PERM.	93.05	0.0021
TOTAL	954.18	0.0219

20' 0 20' 40'

SCALE: 1"=20' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

REV NO	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W25

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 20', VERTICAL TBD

SHEET NUMBER 18

REVISION 0

STATUS: ISSUED FOR PERMIT

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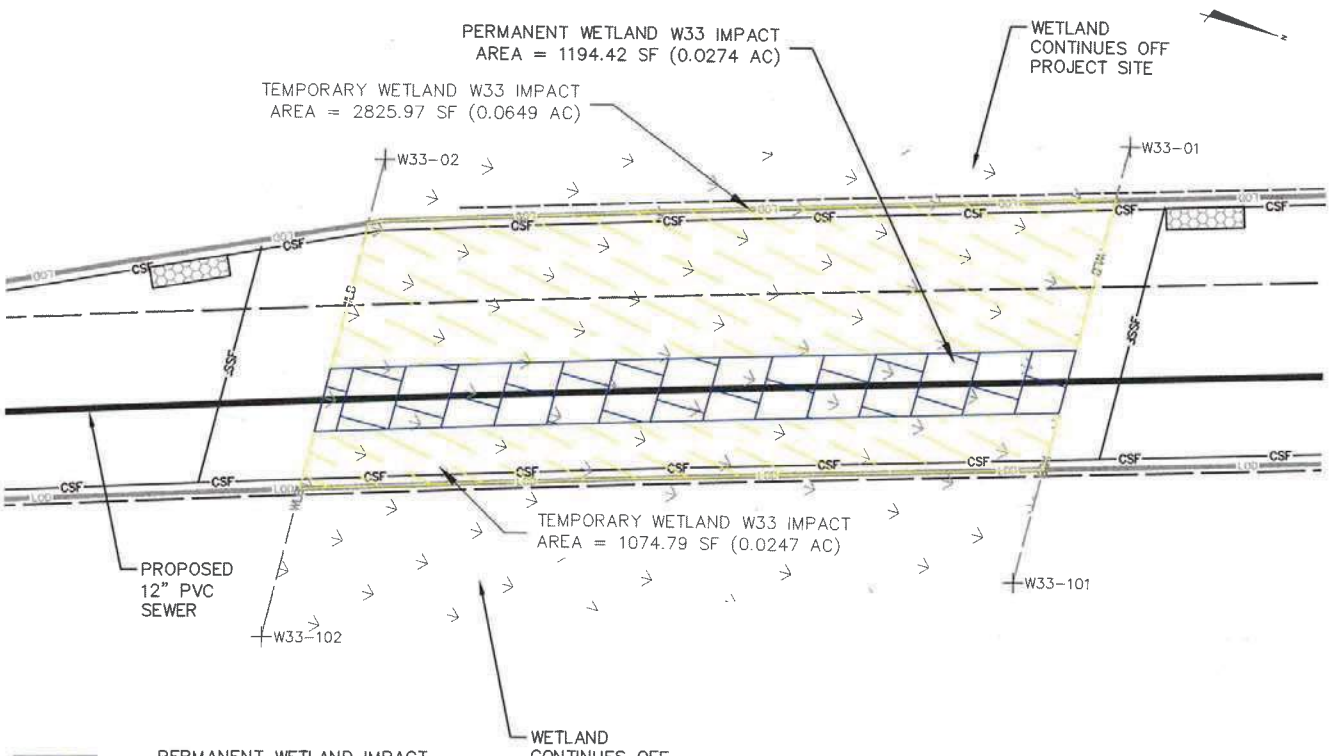

WETLAND W33 FLAG TABLE

FLAG #	NORTHING	EASTING
W33-01	440158.18	2001604.29
W33-02	440043.94	2001638.58
W33-101	440159.26	2001676.47
W33-102	440045.28	2001717.45

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LOD — LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W33"	SQ FT	ACRE
ALLOWABLE TEMP.	3900.76	0.0895
ALLOWABLE PERM.	1194.42	0.0274
TOTAL	5095.18	0.1170

20' 0 20' 40'

SCALE: 1"=20' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

REVISIONS			
NO.	DESCRIPTION	DATE	
1	ISSUED FOR PERMIT	APRIL 2020	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W33

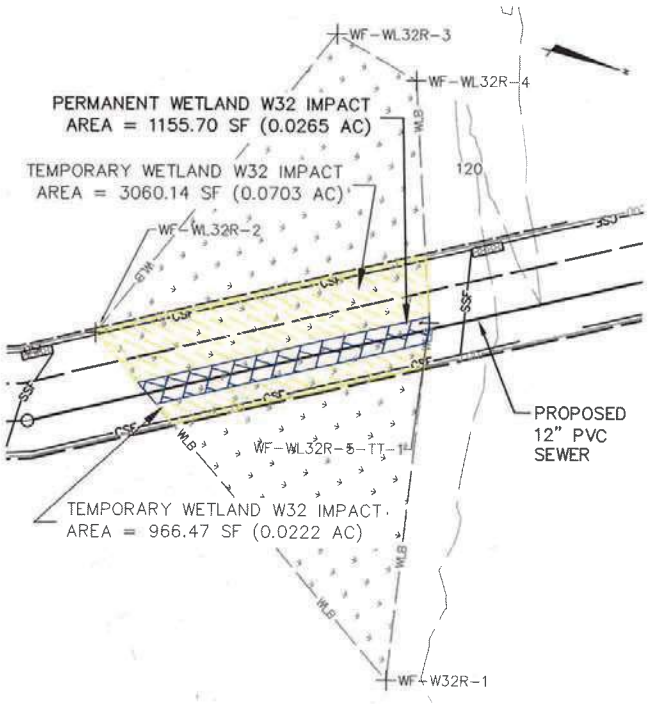
PROJ. START DATE	01/13/2020
MCE PROJ. #	01925.0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WHH
REVIEWED	BNL
STATUS	ISSUED FOR PERMIT

SCALE: HORIZONTAL 1" = 20' VERTICAL TBD

SHEET 19

ADDENDUM # 0

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\01925-0005 WETLAND IMPACT.DWG 04/21/2020 13:30:03 ANDREW BRANCH



WETLAND W32 FLAG TABLE

FLAG #	NORTHING	EASTING
WF-W32R-1	440389.07	2001685.64
WF-WL32R-2	440239.60	2001582.30
WF-WL32R-3	440300.53	2001441.71
WF-WL32R-4	440336.20	2001451.31
WF-WL32R-5-TT-1	440367.36	2001543.11

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W32"	SQ FT	ACRE
ALLOWABLE TEMP.	4026.61	0.0924
ALLOWABLE PERM.	1155.70	0.0265
TOTAL	5182.31	0.1190

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

NO.	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	APRIL 2020

REVISIONS

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955 Old Wilmington Road, Fayetteville, NC 28301

BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W32

PROJ. START DATE	01/13/2020
DESIGNED	JJM
DRAWN	AWB
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 50' VERTICAL TBD

20

0

STATUS: ISSUED FOR PERMIT

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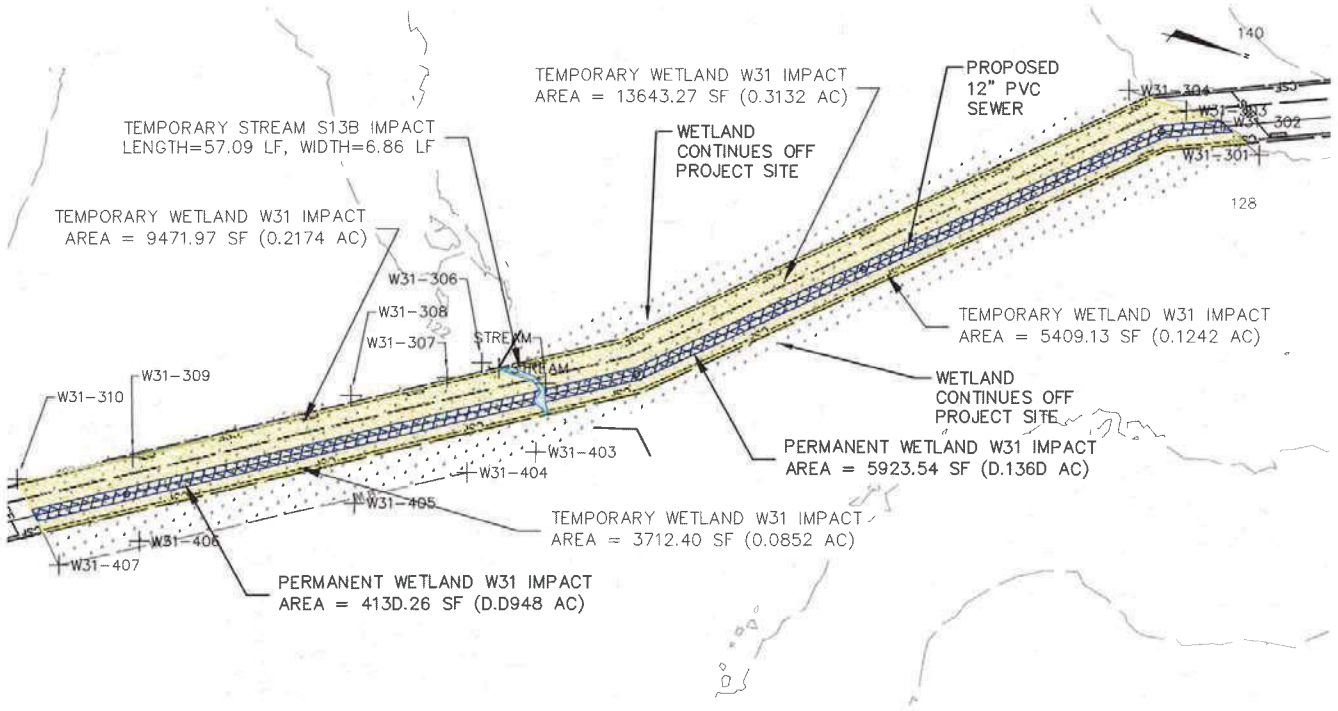

PERMANENT WETLAND IMPACT
(BASED ON 1D' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 24 FOR WETLAND
"W31" FLAGS AND TOTAL IMPACTS

SEE SHEET 32 FOR S13B IMPACTS

100' 0 100' 200'

SCALE: 1"=100' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

REV NO	REVISIONS	DATE

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W31, S13B (SHEET 1 OF 4)

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL 1" = 100'
VERTICAL TBD

21

0

STATUS
ISSUED FOR PERMIT

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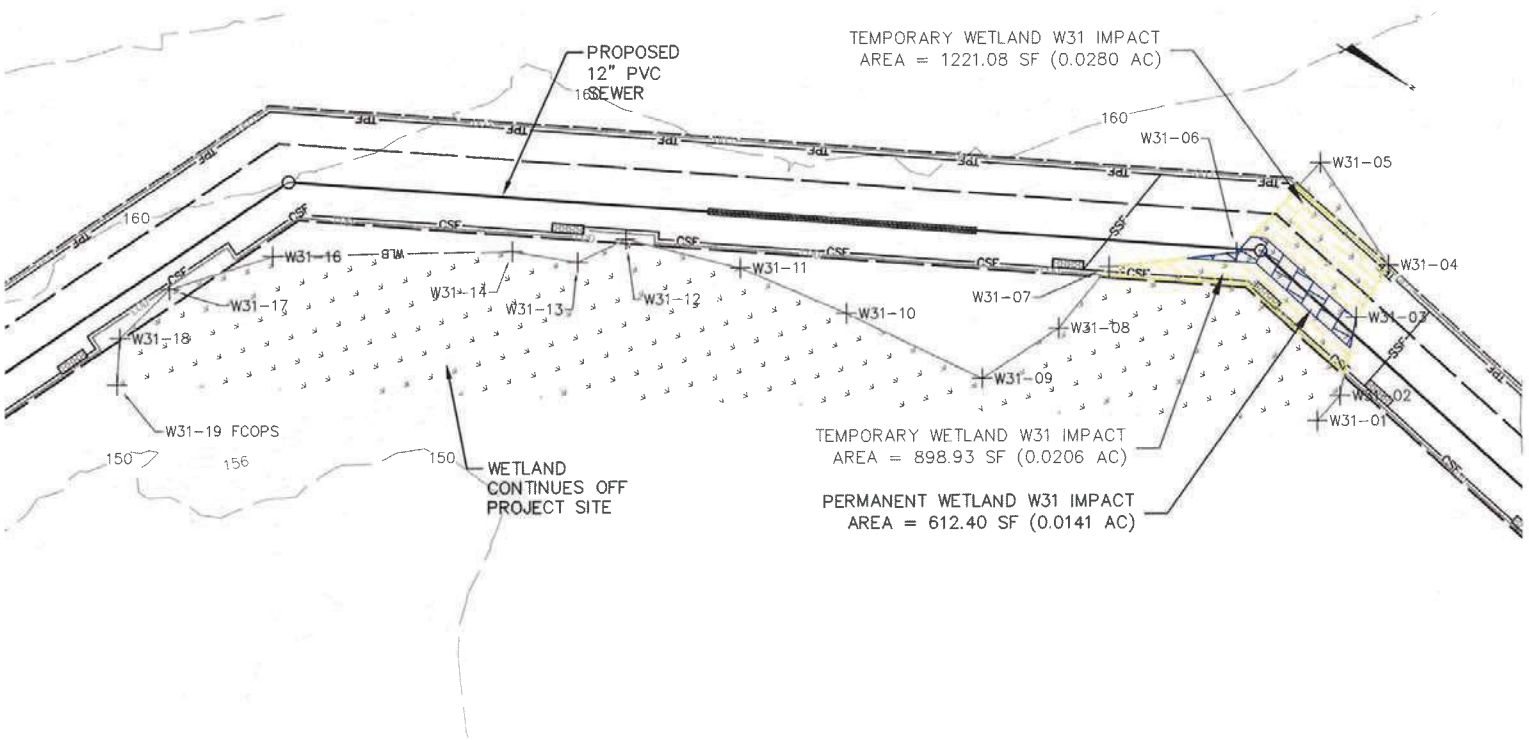

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 24 FOR WETLAND
"W31" FLAGS AND TOTAL IMPACTS

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

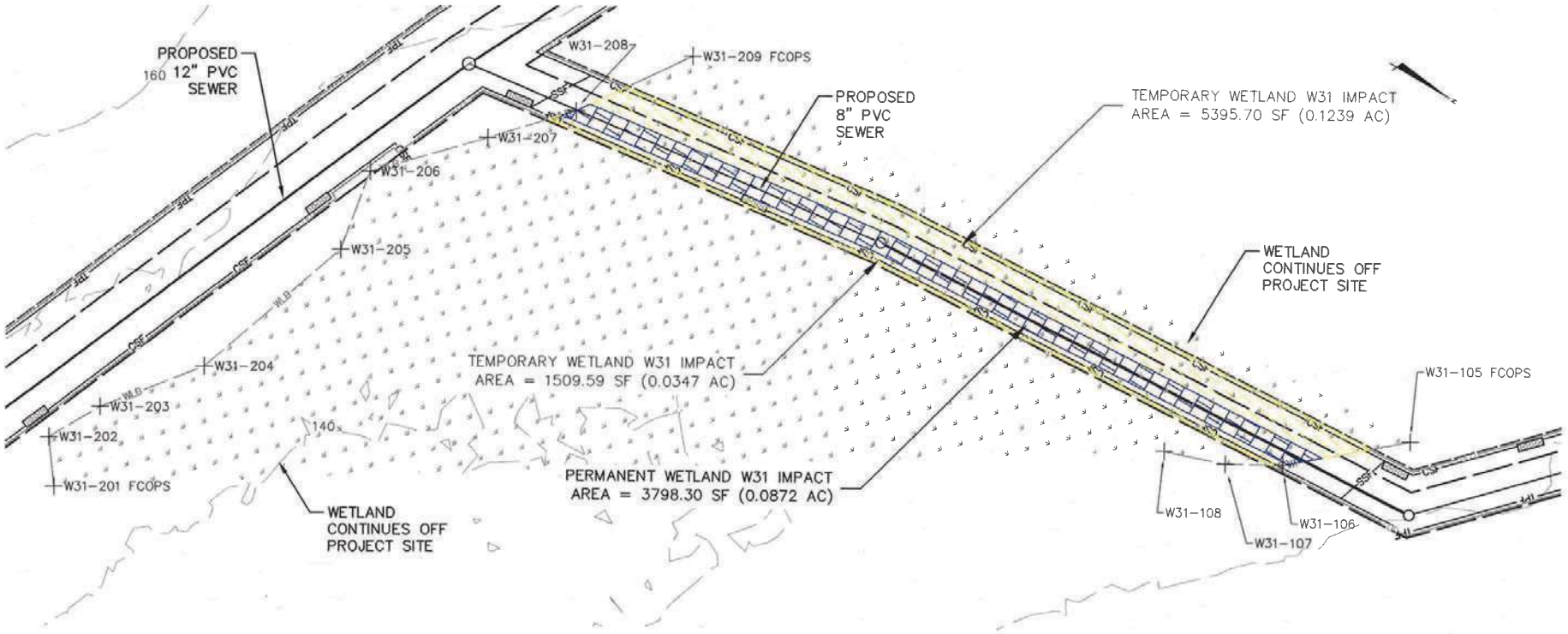
W31, S13B (SHEET 2 OF 4)

PROJ. START DATE	01/31/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 50' VERTICAL TBD

SHEET 22 of 0

STATUS: ISSUED FOR PERMIT



PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 24 FOR WETLAND
"W31" FLAGS AND TOTAL IMPACTS

50' 0 50' 100'
SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-29-2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W31, S13B (SHEET 3 OF 4)

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WDH
PROJ MGR	RRL

SCALE
HORIZONTAL 1"=50'
VERTICAL TBD

23
0

STATUS
ISSUED FOR PERMIT

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WETLAND W31 FLAG TABLE

FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING
W31-01	443093.19	1999351.44	W31-107	442738.99	2000158.86	W31-403	440884.59	2001317.85
W31-02	443095.93	1999338.18	W31-108	442711.01	2000168.40	W31-404	440835.80	2001347.79
W31-03	443085.81	1999307.94	W31-201 FCOPS	442269.85	2000445.32	W31-405	440755.52	2001394.13
W31-04	443086.64	1999283.45	W31-202	442256.19	2000426.47	W31-406	440596.55	2001467.85
W31-05	443042.69	1999261.58	W31-203	442270.01	2000402.25	W31-407	440539.16	2001503.36
W31-06	443031.10	1999309.52	W31-204	442302.62	2000361.67			
W31-07	442989.60	1999339.86	W31-205	442330.26	2000282.84			
W31-08	442984.29	1999371.21	W31-206	442323.76	2000244.60			
W31-09	442967.57	1999404.06	W31-207	442362.84	2000203.77			
W31-10	442907.18	1999408.79	W31-208	442392.14	2000171.99			
W31-11	442860.97	1999414.43	W31-209 FCOPS	442426.33	2000122.23			
W31-12	442815.31	1999427.50	W31-301	441384.53	2000936.99			
W31-13	442803.26	1999445.03	W31-302	441348.10	2000919.30			
W31-14	442778.63	1999454.32	W31-303	441318.89	2000917.78			
W31-16	442696.17	1999503.88	W31-304	441270.41	2000914.00			
W31-17	442666.56	1999536.10	W31-306	440824.37	2001259.57			
W31-18	442659.28	1999562.94	W31-307	440800.62	2001278.30			
W31-19 FCOPS	442667.52	1999579.43	W31-308	440730.43	2001311.45			
W31-105 FCOPS	442808.66	2000105.74	W31-309	440574.08	2001404.66			
W31-106	442762.34	2000145.62	W31-310	440488.73	2001445.41			

NOTE:
SEE SHEET 32 FOR STREAM S13B IMPACTS

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
WETLAND IMPACTS		
WETLAND "W31"	SQ FT	ACRE
ALLOWABLE TEMP.	41262.07	0.9472
ALLOWABLE PERM.	14464.50	0.3321
TOTAL	55726.57	1.2793

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W31, S13B (SHEET 4 OF 4)

PROJ. START DATE 04/13/2020
NCE PROJ. # 01925-0005
DRAWN AWB
DESIGNED JJW
CHECKED WBH
PROJ. MGR BRL

SCALE
HORIZONTAL TBD
VERTICAL TBD

24
0

STATUS
ISSUED FOR PERMIT

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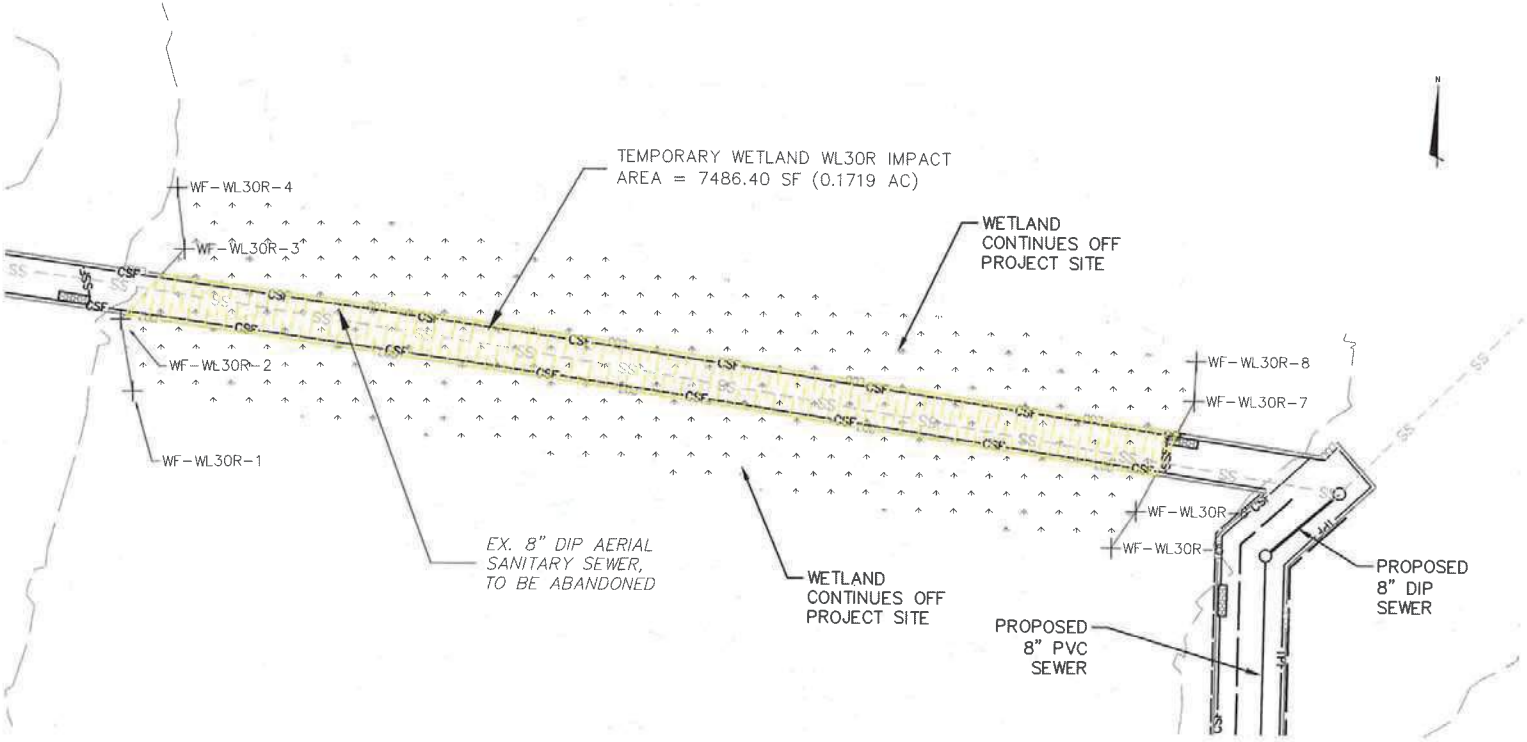

WETLAND WL30R FLAG TABLE

FLAG #	NORTHING	EASTING
WF-WL30R-1	443620.49	1999319.16
WF-WL30R-2	443649.16	1999314.24
WF-WL30R-3	443677.18	1999339.72
WF-WL30R-4	443701.78	1999336.84
WF-WL30R-5	443560.22	1999711.90
WF-WL30R-6	443574.98	1999721.67
WF-WL30R-7	443619.25	1999744.86
WF-WL30R-8	443635.15	1999745.46

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
WETLAND IMPACTS		
WETLAND "WL30R"	SQ FT	ACRE
ALLOWABLE TEMP.	7486.40	0.1719
ALLOWABLE PERM.	0	0
TOTAL	7486.40	0.1719

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

DESCRIPTION	DATE
SUBMITTED FOR PERMIT	APRIL 2020
REVISIONS	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

WL30R

PROJ. START DATE	01/12/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	RWGH
PROJ. MGR.	BWL

SCALE: HORIZONTAL 1" = 50' VERTICAL TBD

DRAWING NUMBER: 25

REVISION: 0

STATUS: ISSUED FOR PERMIT

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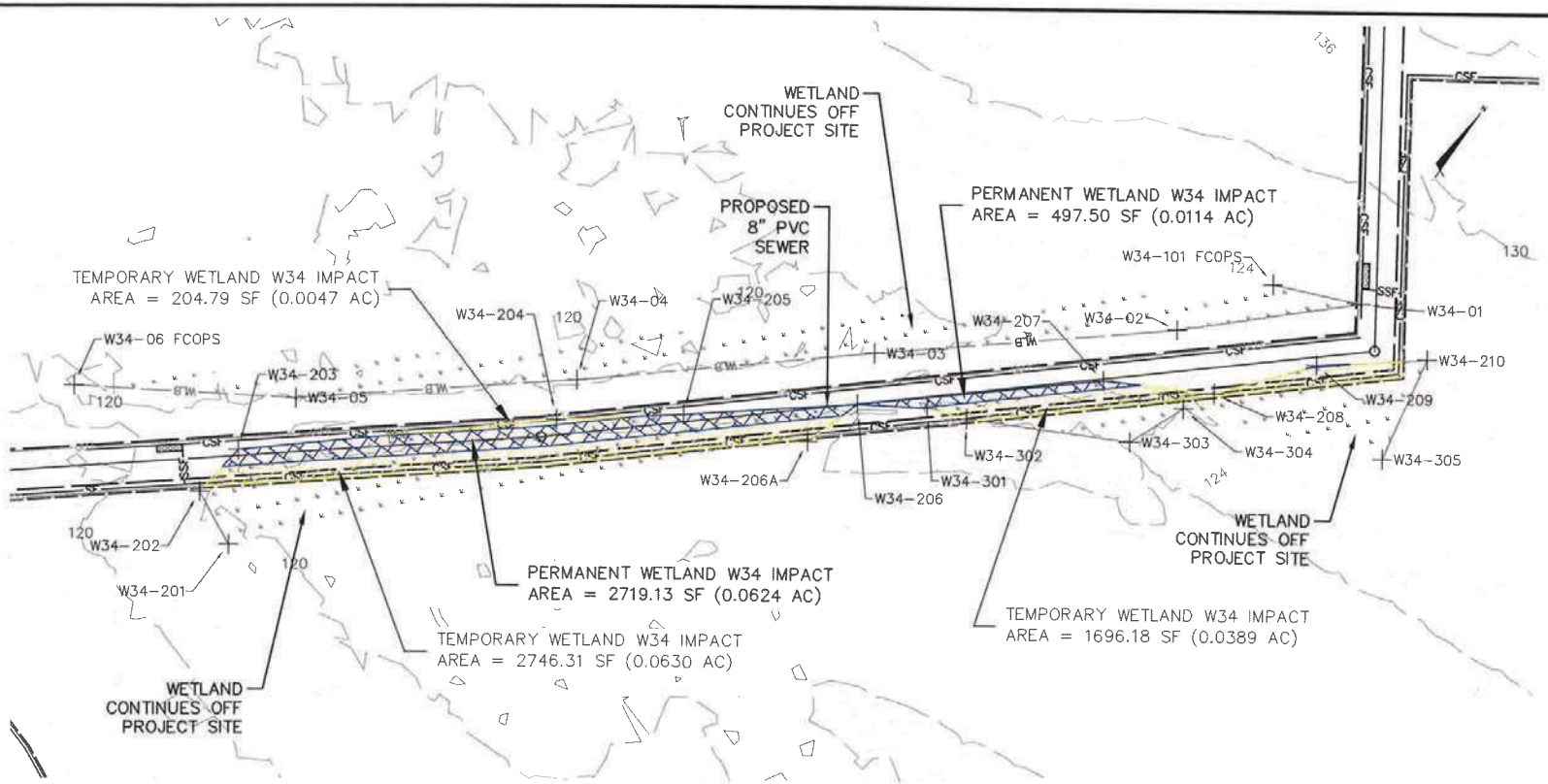

WETLAND W34 FLAG TABLE

FLAG #	NORTHING	EASTING
W34-01	441075.64	2005311.03
W34-02	441011.98	2005244.16
W34-03	440915.26	2005128.44
W34-04	440818.62	2005015.56
W34-05	440731.92	2004907.72
W34-06 FCOPS	440674.16	2004814.19
W34-101 FCOPS	441058.22	2005270.14
W34-201	440653.58	2004922.13
W34-202	440666.73	2004895.28
W34-203	440694.56	2004899.18
W34-204	440796.84	2005018.76
W34-205	440835.32	2005068.70
W34-206	440889.72	2005136.24
W34-206A	440860.35	2005126.76
W34-207	440970.28	2005228.98
W34-208	440997.22	2005277.49
W34-209	441038.38	2005310.87
W34-210	441072.68	2005354.30
W34-301	440908.32	2005165.56
W34-302	440915.36	2005184.62
W34-303	440953.23	2005257.18
W34-304	440982.28	2005269.32
W34-305	441019.53	2005364.45

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W34"	SQ FT	ACRE
ALLOWABLE TEMP.	4647.28	0.1067
ALLOWABLE PERM.	3216.63	0.0738
TOTAL	7863.91	0.1805

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

60' 0 60' 120'
SCALE: 1"=60' (Horiz.)

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W34

PROJ. START DATE 4/13/2020
MCK PROJ. # 01925-0005
DRAWN AWB
DESIGNED JJW
CHECKED WDH
PROJ. MGR BWL

SCALE
HORIZONTAL 1" = 60'
VERTICAL TBD

26
NO. SHEET NUMBER
0
REVISION

STATUS ISSUED FOR PERMIT

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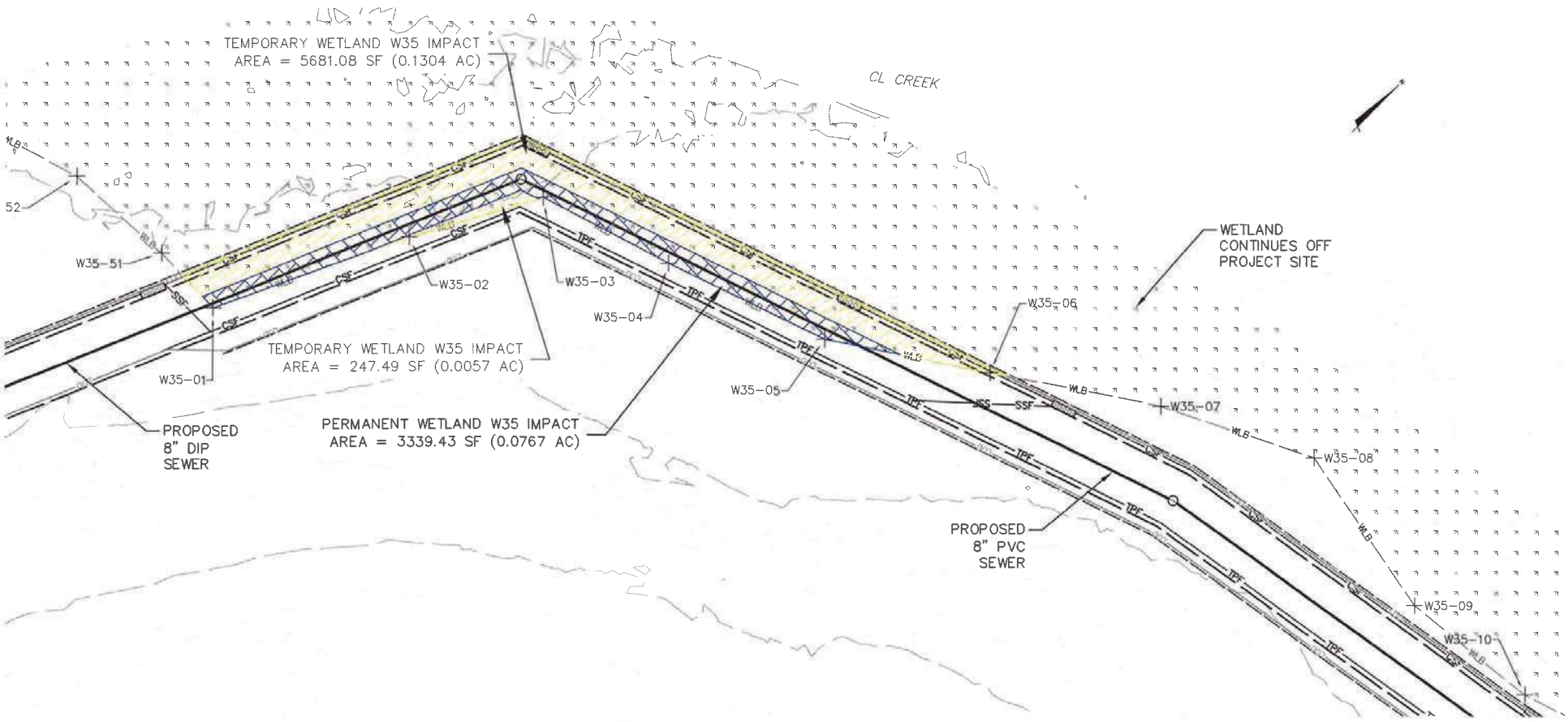

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

PERMANENT WETLAND IMPACT
(BASED ON 10' PERMANENT
MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

NOTE:
SEE SHEET 30 FOR WETLAND
"W35" FLAGS AND TOTAL IMPACTS

50' 0 50' 100'

SCALE: 1"=50' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

REVISIONS

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W35 (SHEET 1 OF 4)

PROJ START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJW
CHECKED	WOH
PROJ. MGR.	SAL

SCALE: HORIZONTAL 1" = 50', VERTICAL TBD

27

0

STATUS: ISSUED FOR PERMIT

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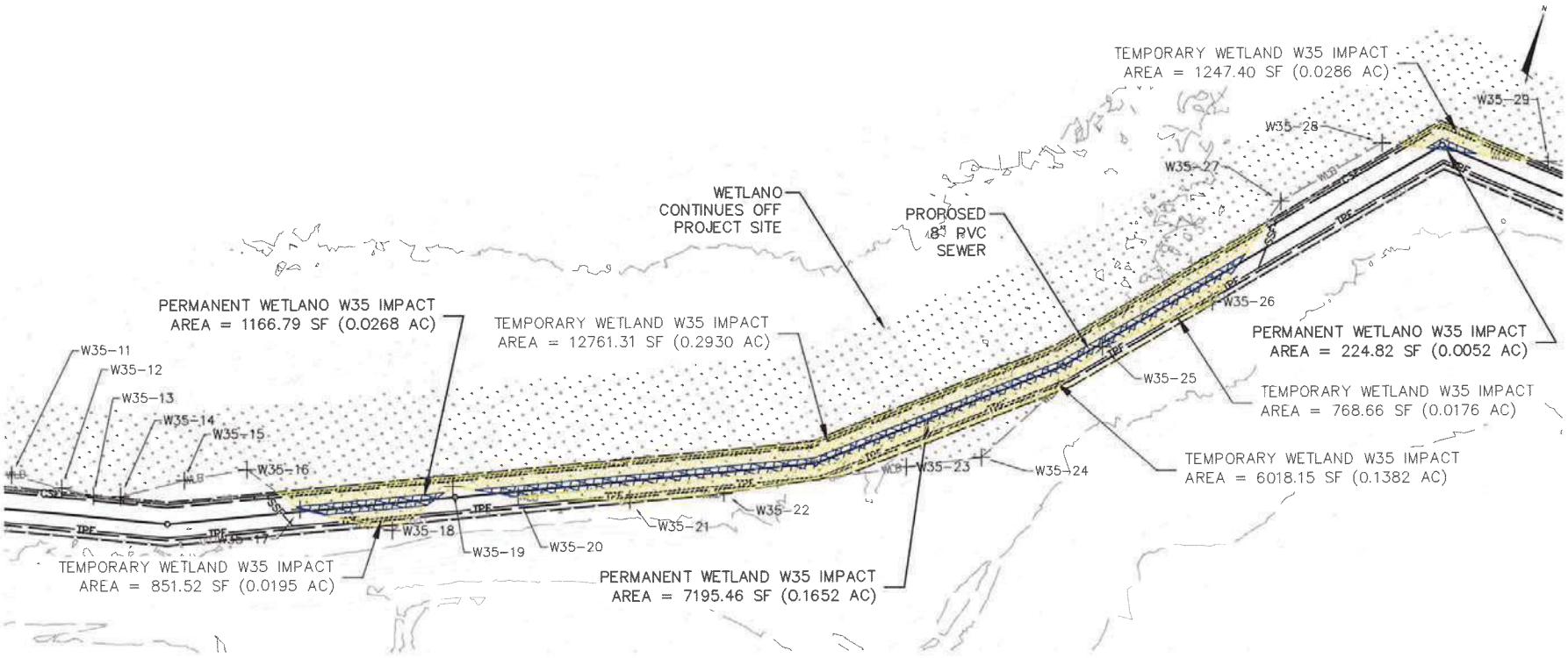

PERMANENT WETLANO IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIOOR)

TEMPORARY WETLANO IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF OISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 30 FOR WETLANO
"W35" FLAGS ANO TOTAL IMPACTS

100' 0 100' 200'

SCALE: 1"=100' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

DESCRIPTION	DATE
0 ISSUED FOR PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W35 (SHEET 2 OF 4)

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 100' VERTICAL TBD

28

0

STATUS: ISSUED FOR PERMIT

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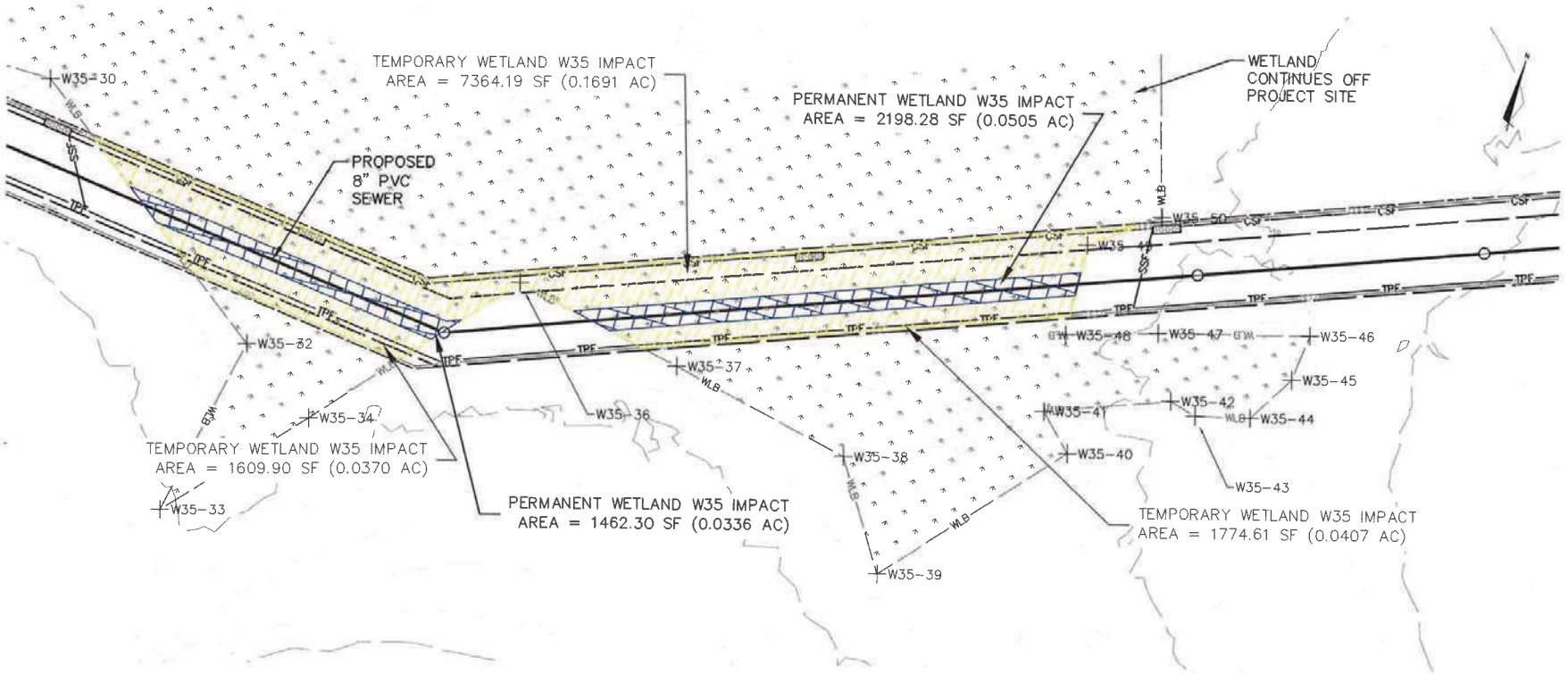

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

NOTE:
SEE SHEET 30 FOR WETLAND "W35" FLAGS AND TOTAL IMPACTS

100' 0 100' 200'
SCALE: 1"=100' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

REVISIONS			
NO.	DESCRIPTION	DATE
1	SELECTED PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

W35 (SHEET 3 OF 4)

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	RWB
DESIGNED	JJW
CHECKED	WOH
PROJ. MGR.	BRL

SCALE
HORIZONTAL 1" = 100'
VERTICAL TBD

29
0

STATUS: ISSUED FOR PERMIT

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\01925-0005 WETLAND IMPACT.DWG 04/21/2020 13:39:03 ANDREW BRANCH

WETLAND W35 FLAG TABLE

FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING	FLAG #	NORTHING	EASTING
W35-01	443795.50	1989574.43	W35-21	444259.38	1990768.47	W35-43	444761.44	1992147.02
W35-02	443888.51	1989618.22	W35-22	444287.94	1990850.33	W35-44	444767.22	1992171.33
W35-03	443948.92	1989651.01	W35-23	444353.60	1991005.82	W35-45	444788.88	1992185.09
W35-04	443970.13	1989717.97	W35-24	444379.71	1991070.51	W35-46	444810.02	1992187.63
W35-05	443998.71	1989799.12	W35-25	444505.20	1991151.97	W35-47	444792.64	1992120.94
W35-06	444045.31	1989868.82	W35-26	444570.64	1991238.70	W35-48	444780.61	1992081.17
W35-07	444093.86	1989940.37	W35-27	444675.00	1991276.38	W35-49	444821.93	1992079.66
W35-08	444129.87	1990012.52	W35-28	444750.37	1991352.99	W35-50	444842.84	1992108.47
W35-09	444113.66	1990099.39	W35-29	444772.56	1991505.08	W35-51	443796.60	1989537.49
W35-10	444121.63	1990169.11	W35-30	444769.77	1991611.05	W35-52	443793.37	1989480.90
W35-11	444136.92	1990216.24	W35-32	444678.47	1991727.77	W35-53	443774.42	1989419.51
W35-12	444136.73	1990263.60	W35-33	444596.49	1991709.60	W35-54	443757.07	1989388.73
W35-13	444137.53	1990293.87	W35-34	444653.41	1991763.08			
W35-14	444143.49	1990318.03	W35-36	444736.62	1991838.26			
W35-15	444172.49	1990370.36	W35-37	444719.42	1991916.04			
W35-16	444197.01	1990423.57	W35-38	444700.89	1991999.45			
W35-17	444174.30	1990479.77	W35-39	444654.28	1992028.45			
W35-18	444176.92	1990565.74	W35-40	444729.68	1992096.38			
W35-19	444230.24	1990609.16	W35-41	444745.10	1992080.99			
W35-20	444236.45	1990668.80	W35-42	444764.81	1992134.57			

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS

WETLAND IMPACTS		
WETLAND "W35"	SQ FT	ACRE
ALLOWABLE TEMP.	38324.31	0.8798
ALLOWABLE PERM.	15587.08	0.3578
TOTAL	53911.39	1.2376

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-29-2020

REVISIONS

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS
W35 (SHEET 4 OF 4)

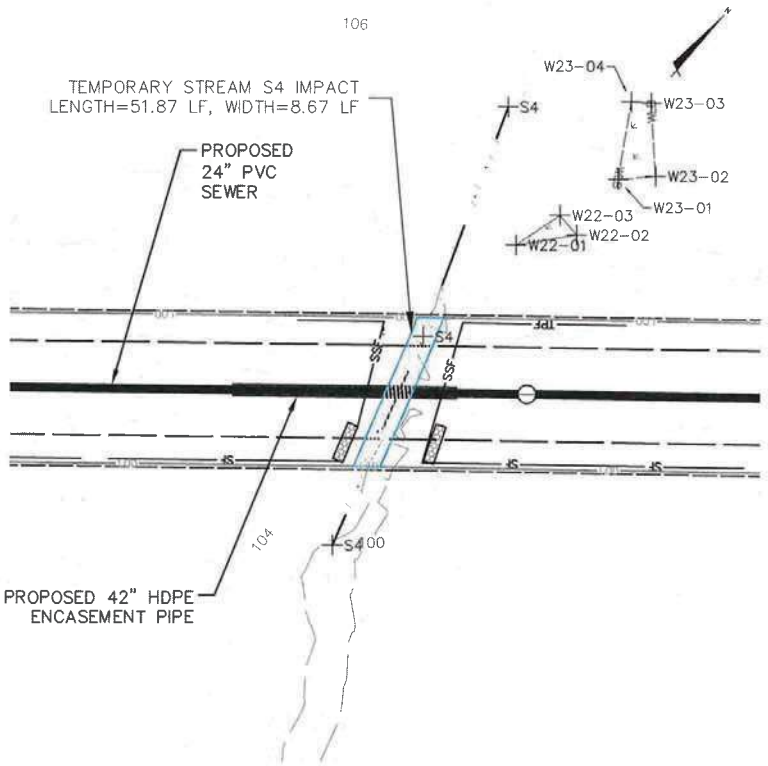
PROJ. START DATE: 01/13/2020
MCK PROJ. #: 01925-0005
DRAWN: AWB
DESIGNED: JJM
CHECKED: WOH
PROJ. MGR.: BRL

SCALE
HORIZONTAL: TBD
VERTICAL: TBD

30
0

STATUS
ISSUED FOR PERMIT

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\01925-0005 WETLAND IMPACT.DWG 04/21/2020 13:40:18 ANDREW BRANCH



PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S4"	LENGTH (LF)	WIDTH (LF)
S4 TEMP.	51.87	8.67
S4 PERM.	0	0
TOTAL	51.87	8.67

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

40' 0 40' 80'
SCALE: 1"=40' (Horiz.)

NO.	REVISIONS	DATE	APPR.
0	ISSUED FOR PERMIT	APRIL 2020	

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S4

PROJ. START DATE	01/31/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJP
CHECKED	WOH
PROJ. MGR.	BRL

SCALE
HORIZONTAL 1" = 40'
VERTICAL TBD

31
0

STATUS
ISSUED FOR PERMIT

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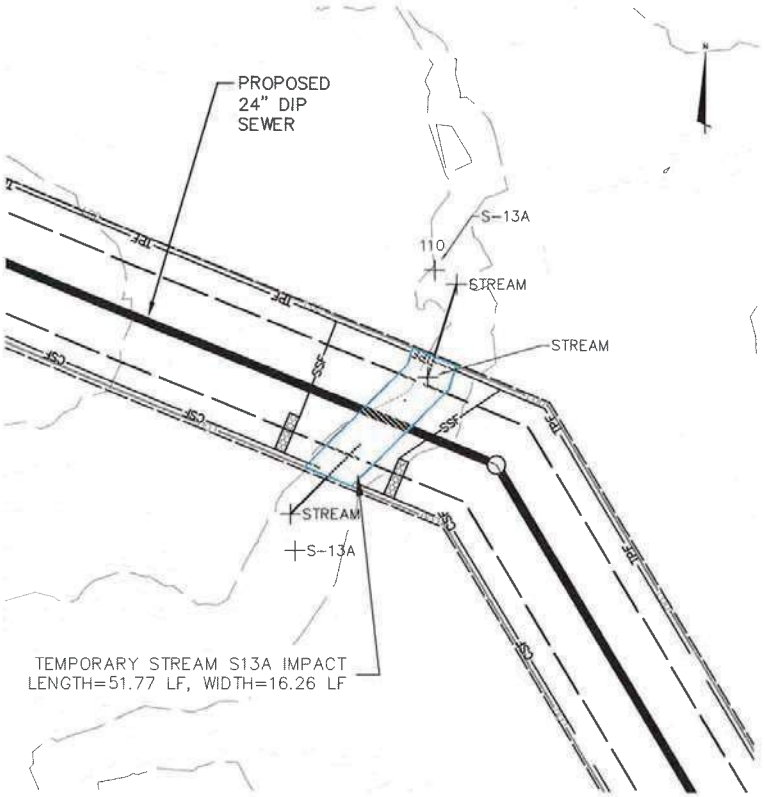

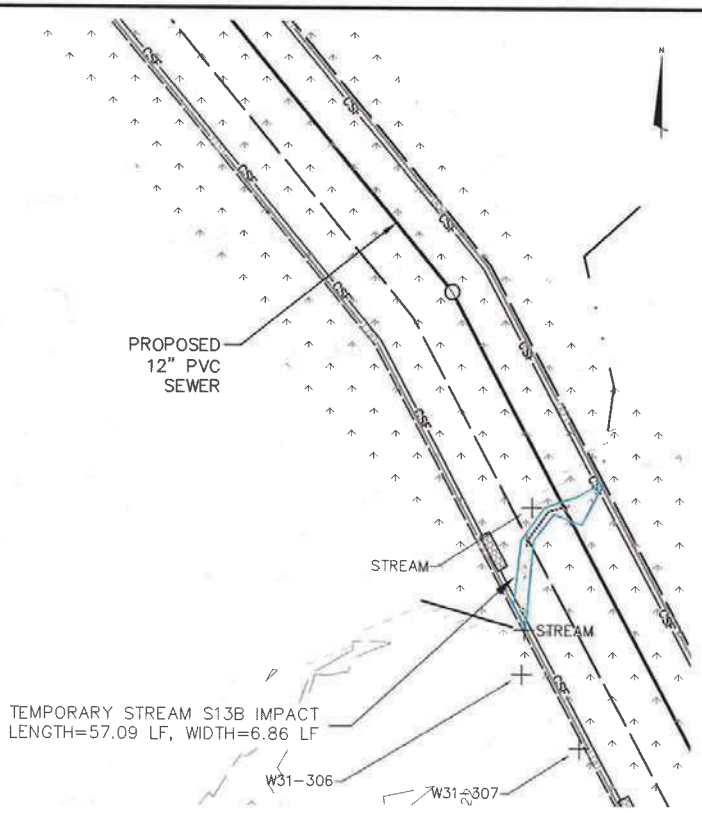

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S13"	LENGTH (LF)	WIDTH (LF)
S13A-MAIN OUTFALL TEMP.	51.77	16.26
S13A-MAIN OUTFALL PERM.	D	D
S13B-CAMDEN WOODS TEMP.	57.09	6.86
S13B-CAMDEN WOODS PERM.	D	0
TOTAL	108.85	23.12

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-29-2020

40' 0 40' 80'
SCALE: 1"=40' (Horiz.)

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S13A, S13B

PROJ. START DATE	01/31/2025
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE
HORIZONTAL 1" = 40'
VERTICAL TBD

32

0

STATUS
ISSUED FOR PERMIT

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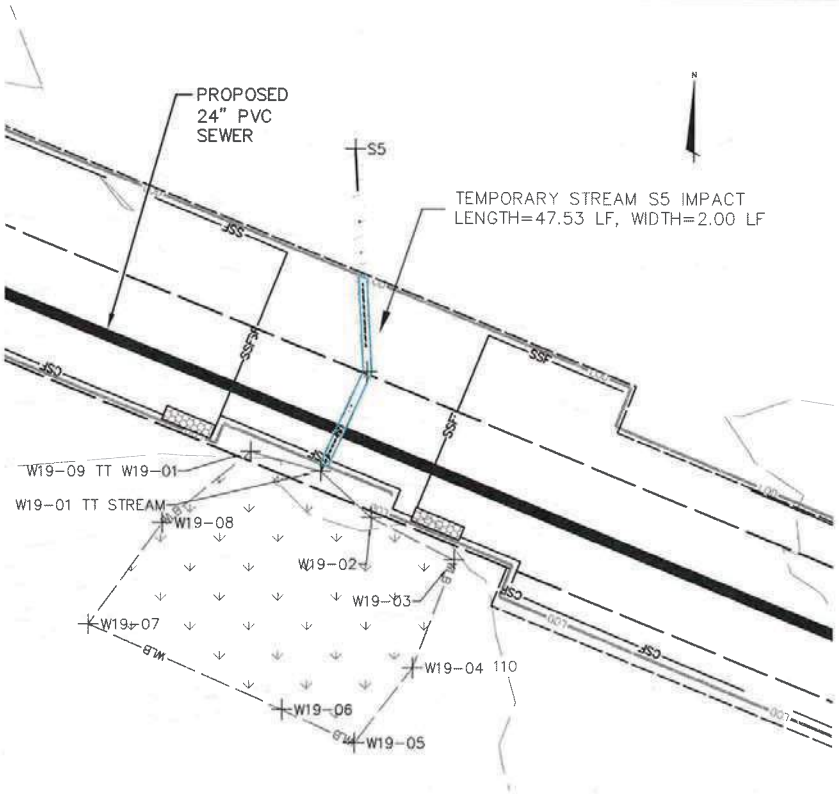

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S5"	LENGTH (LF)	WIDTH (LF)
S5 TEMP.	47.53	2.00
S5 PERM.	0	0
TOTAL	47.53	2

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

30' 0 30' 60'
SCALE: 1"=30' (Horiz.)

REVISIONS		
#	ISSUED FOR PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S5

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WCH
PROJ. MGR	ARL

SCALE
HORIZONTAL 1"=30'
VERTICAL TBD

33
0

STATUS: ISSUED FOR PERMIT

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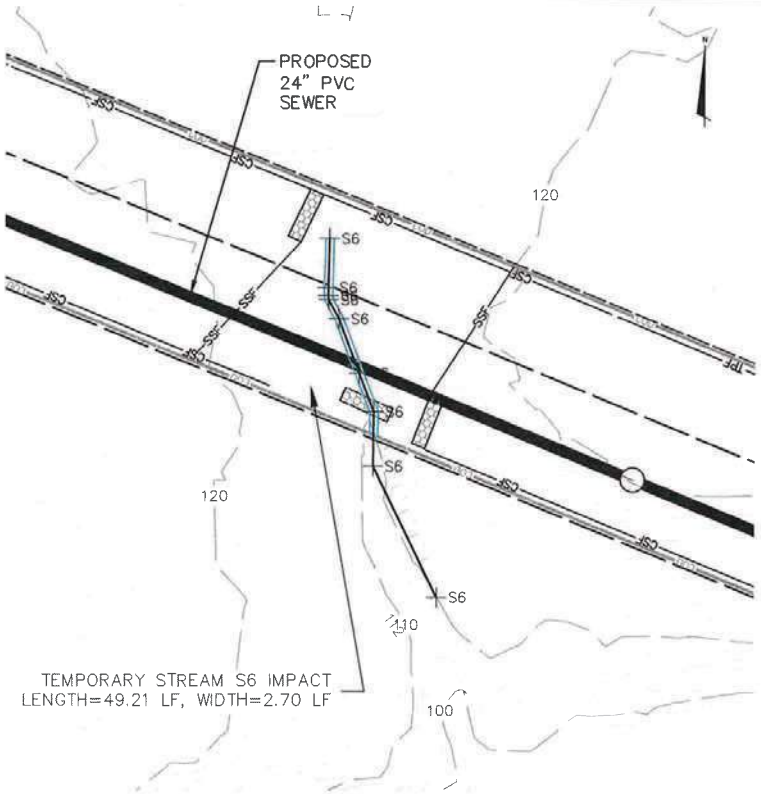

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S6"	LENGTH (LF)	WIDTH (LF)
S6 TEMP.	49.21	2.70
S6 PERM.	0	0
TOTAL	49.21	2.7

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

30' 0 30' 60'

SCALE: 1"=30' (Horiz.)

REV NO	DESCRIPTION	DATE
0	ISSUED FOR PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S6

PROJ. START DATE	01/13/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR	BRL

SCALE: HORIZONTAL 1" = 30', VERTICAL TBD

34

0

STATUS: ISSUED FOR PERMIT

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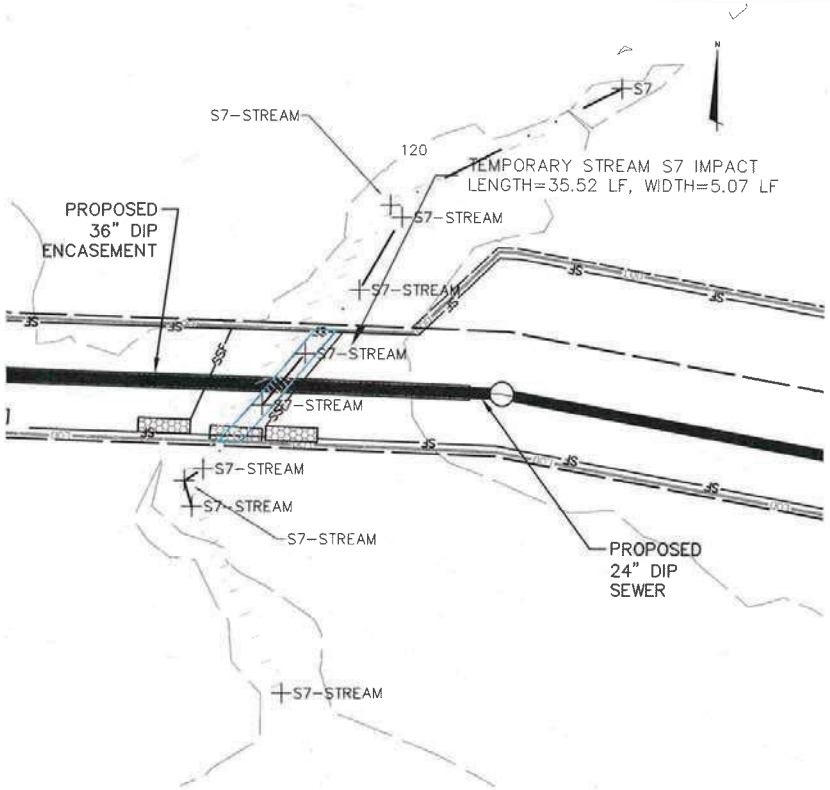

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S7"	LENGTH (LF)	WIDTH (LF)
S7 TEMP.	35.52	5.07
S7 PERM.	0	0
TOTAL	35.52	5.07

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

30' 0 30' 60'
SCALE: 1"=30' (Horiz.)

REVISIONS		
NO.	DESCRIPTION	DATE
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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S7

PROJ. START DATE	04/15/2020
MCE PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR.	WHL

SCALE: HORIZONTAL 1" = 30', VERTICAL TBD

35

0

STATUS: ISSUED FOR PERMIT

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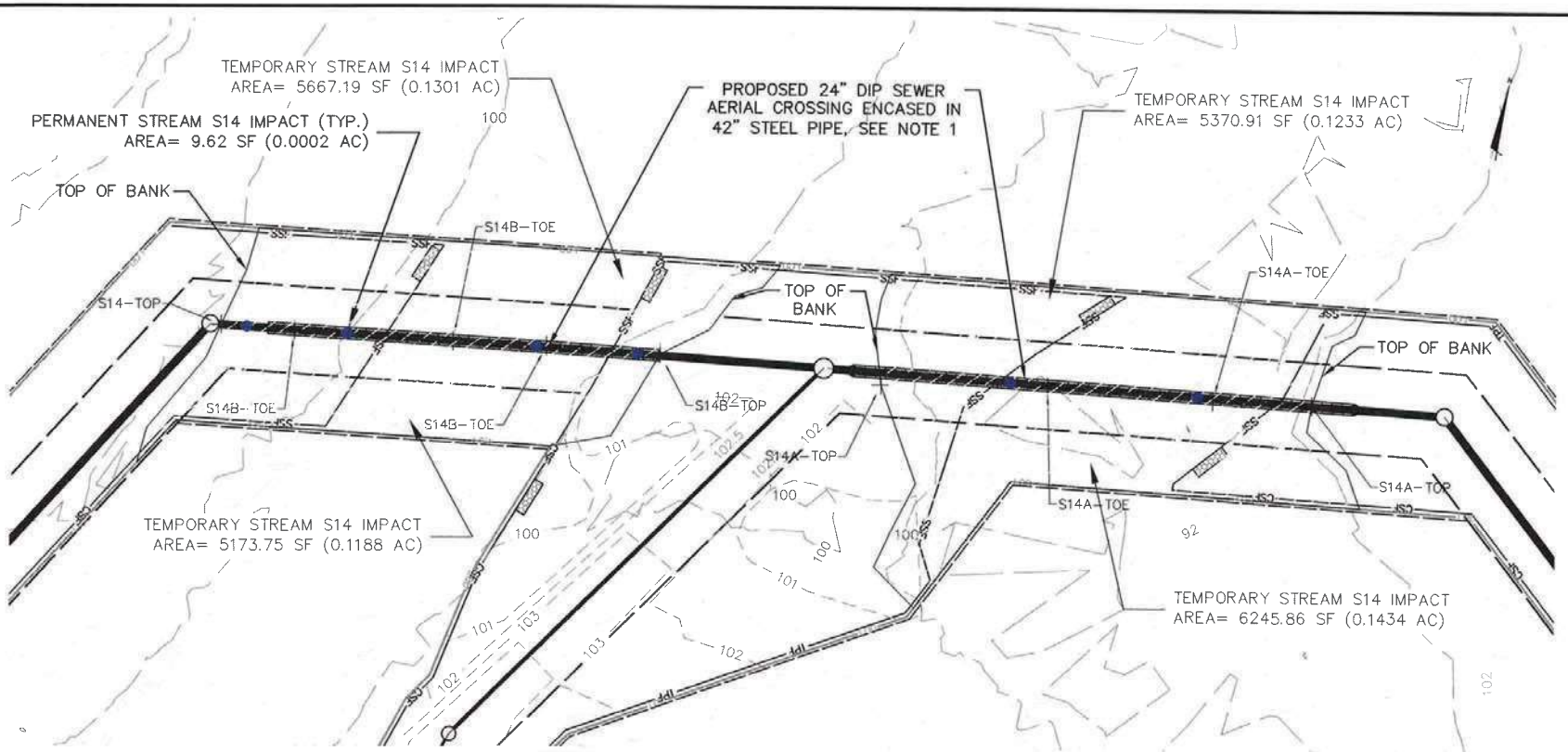

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

PERMANENT STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OUTFALL WETLAND AND STREAM IMPACTS		
STREAM IMPACTS		
STREAM "S14" – BIG ROCKFISH CREEK	SQ FT	ACRE
ALLOWABLE TEMP.	22457.71	0.5156
ALLOWABLE PERM. (6 PIERS)	57.73	0.0013
TOTAL	22515.44	0.5169

NOTES:
1. PROPOSED AERIAL SEWER CROSSING IS SUPPORTED SIX (6) 42–INCH DIAMETER CONCRETE PIERS WHICH CONSTITUTE THE PERMANENT STREAM IMPACT.
2. CONSTRUCTION IMPACTS ARE TEMPORARY, GRADE TO BE RESTORED.

40' 0 40' 80'

SCALE: 1"=40' (Horiz.)

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS

4-28-2020

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BIG ROCKFISH CREEK OUTFALL

WETLAND & STREAM IMPACTS

S14 - BIG ROCKFISH CREEK

PROJ. START DATE 01/13/2020
MCF PROJ. # 01925.0005
DRAWN AWB
DESIGNED JJM
CHECKED WOH
PROJ. MGR BKL

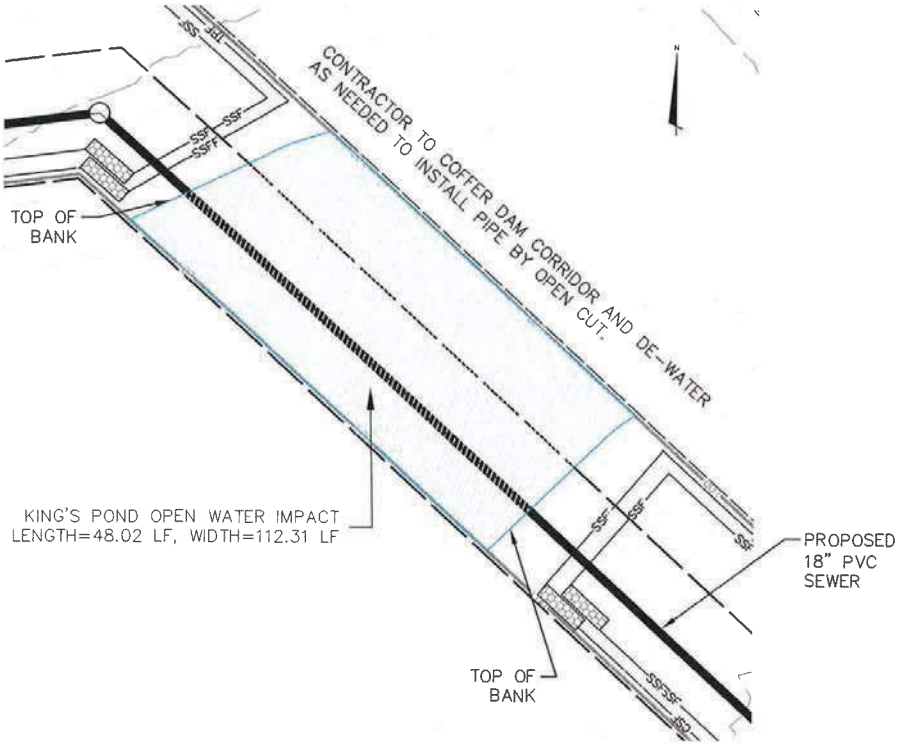
SCALE
HORIZONTAL 1" = 40'
VERTICAL TBD

36

0

STATUS ISSUED FOR PERMIT

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\01925-0005 WETLAND IMPACT.DWG 04/21/2020 13:48:09 ANDREW BRANCH



NOTE:
CONTRACTOR MEANS AND METHODS WILL DICTATE WHAT MATERIALS AND APPROACH WILL BE USED TO INSTALL THE COFFER DAM.

PERMANENT WETLAND IMPACT (BASED ON 10' PERMANENT MAINTENANCE CORRIDOR)

TEMPORARY WETLAND IMPACT

TEMPORARY STREAM IMPACT

LIMITS OF DISTURBANCE

SILT FENCE OUTLET

BIG ROCKFISH CREEK OPEN WATER IMPACT		
KING'S POND	LENGTH (LF)	WIDTH (LF)
TEMPORARY	48.02	112.31
PERMANENT	0	0
TOTAL	48.02	112.31

NORTH CAROLINA PROFESSIONAL SEAL 049224 ENGINEER WESLEY O. HUTCHINS
4-28-2020

30' 0 30' 60'
SCALE: 1"=30' (Horiz.)

NO.	DESCRIPTION	DATE
4	REVISIONS PER PERMIT	APRIL 2020

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BIG ROCKFISH CREEK OUTFALL
WETLAND & STREAM IMPACTS
KING'S POND OPEN WATER IMPACT

PROJ. START DATE	01/13/2020
MCK PROJ. #	01925-0005
DRAWN	AWB
DESIGNED	JJM
CHECKED	WOH
PROJ. MGR.	BRL

SCALE: HORIZONTAL TBD, VERTICAL TBD
SHEET NO. 37
SCHEDULED HOURS 0
STATUS: ISSUED FOR PERMIT

I:\01925\0005\WATER\80-DRAWINGS\86-DESIGN\WETLAND IMPACT\01925-0005 WETLAND IMPACT.DWG 04/23/2020 09:28:58 ANDREW BRANCH

NATIONWIDE PERMIT 12
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
FINAL NOTICE OF ISSUANCE AND MODIFICATION OF NATIONWIDE PERMITS
FEDERAL REGISTER
AUTHORIZED MARCH 19, 2017

Utility Line Activities. Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project.

Utility lines: This NWP authorizes discharges of dredged or fill material into waters of the United States and structures or work in navigable waters for crossings of those waters associated with the construction, maintenance, or repair of utility lines, including outfall and intake structures. There must be no change in pre-construction contours of waters of the United States. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and internet, radio, and television communication. The term "utility line" does not include activities that drain a water of the United States, such as drainage tile or french drains, but it does apply to pipes conveying drainage from another area.

Material resulting from trench excavation may be temporarily sidecast into waters of the United States for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a french drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.

Utility line substations: This NWP authorizes the construction, maintenance, or expansion of substation facilities associated with a power line or utility line in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1/2-acre of waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters of the United States to construct, maintain, or expand substation facilities.

Foundations for overhead utility line towers, poles, and anchors: This NWP authorizes the construction or maintenance of foundations for overhead utility line towers, poles, and anchors in all waters of the United States, provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible.

Access roads: This NWP authorizes the construction of access roads for the construction and maintenance of utility lines, including overhead power lines and utility line substations, in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary (see Note 2, below). Access roads must be constructed so that the length of the road minimizes any adverse effects on waters of the United States and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the United States must be properly bridged or culverted to maintain surface flows.

This NWP may authorize utility lines in or affecting navigable waters of the United States even if there is no associated discharge of dredged or fill material (See 33 CFR part 322). Overhead utility lines constructed over section 10 waters and utility lines that are routed in or under section 10 waters without a discharge of dredged or fill material require a section 10 permit.

This NWP authorizes, to the extent that Department of the Army authorization is required, temporary structures, fills, and work necessary for the remediation of inadvertent returns of drilling fluids to waters of the United States through sub-soil fissures or fractures that might occur during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines. These remediation activities must be done as soon as practicable, to restore the affected waterbody. District engineers may add special conditions to this NWP to require a remediation plan for addressing inadvertent returns of drilling fluids to waters of the United States during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the utility line activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After construction, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if any of the following criteria are met: (1) the activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above

grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: Where the utility line is constructed or installed in navigable waters of the United States (i.e., section 10 waters) within the coastal United States, the Great Lakes, and United States territories, a copy of the NWP verification will be sent by the Corps to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), for charting the utility line to protect navigation.

Note 2: For utility line activities crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Utility line activities must comply with 33 CFR 330.6(d).

Note 3: Utility lines consisting of aerial electric power transmission lines crossing navigable waters of the United States (which are defined at 33 CFR part 329) must comply with the applicable minimum clearances specified in 33 CFR 322.5(i).

Note 4: Access roads used for both construction and maintenance may be authorized, provided they meet the terms and conditions of this NWP. Access roads used solely for construction of the utility line must be removed upon completion of the work, in accordance with the requirements for temporary fills.

Note 5: Pipes or pipelines used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the United States are considered to be bridges, not utility lines, and may require a permit from the U.S. Coast Guard pursuant to section 9 of the Rivers and Harbors Act of 1899. However, any discharges of dredged or fill material into waters of the United States associated with such pipelines will require a section 404 permit (see NWP 15).

Note 6: This NWP authorizes utility line maintenance and repair activities that do not qualify for the Clean Water Act section 404(f) exemption for maintenance of currently serviceable fills or fill structures.

Note 7: For overhead utility lines authorized by this NWP, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

Note 8: For NWP 12 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, "District Engineer's Decision." The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

NATIONWIDE PERMIT GENERAL CONDITIONS

The following General Conditions must be followed in order for any authorization by a NWP to be valid:

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status,

unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that

might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non- Federal applicant of the Corps' determination within 45 days of receipt of a complete pre- construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory

birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-

lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill

material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:
"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To

validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the

prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters.

Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and

supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

DISTRICT ENGINEER'S DECISION

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal

individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2-acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site- specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters (e.g., streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and

include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

FURTHER INFORMATION

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

DEFINITIONS

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National

Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the

primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine- marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water

surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

FINAL REGIONAL CONDITIONS 2017

NOTICE ABOUT WEB LINKS IN THIS DOCUMENT:
The web links (both internal to our Wilmington District and any external links to collaborating agencies) in this document are valid at the time of publication. However, the Wilmington District Regulatory Program web page addresses, as with other agency web sites, may change over the timeframe of the five-year Nationwide Permit renewal cycle, in response to policy mandates or technology advances. While we will make every effort to check on the integrity of our web links and provide re-direct pages whenever possible, we ask that you report any broken links to us so we can keep the page information current and usable. We apologize in advanced for any broken links that you may encounter, and we ask that you navigate from the Regulatory home page (Regulatory Permit Program Wetlands and Streams) of the Wilmington District Corps of Engineers, to the "Permits" section of our web site to find links for pages that cannot be found by clicking directly on the listed web link in this document.

Final 2017 Regional Conditions for Nationwide Permits (NWP) in the Wilmington District

1.0 Excluded Waters

The Corps has identified waters that will be excluded from the use of all NWP's during certain timeframes. These waters are:

1.1 Anadromous Fish Spawning Areas

Waters of the United States identified by either the North Carolina Division of Marine Fisheries (NCDMF) or the North Carolina Wildlife Resources Commission (NCWRC) as anadromous fish spawning areas are excluded during the period between February 15 and June 30, without prior written approval from the Corps and either NCDMF or NCWRC.

1.2 Trout Waters Moratorium

Waters of the United States in the designated trout watersheds of North Carolina are excluded during the period between October 15 and April 15 without prior written approval from the NCWRC, or from the Eastern Band of Cherokee Indians (EBCI) Fisheries and Wildlife Management (FWM) office if the project is located on EBCI trust land. (See Section 2.7 for information on the designated trout watersheds).

1.3 Sturgeon Spawning Areas as Designated by the National Marine Fisheries Service (NMFS)

Waters of the United States designated as sturgeon spawning areas are excluded during the period between February 1 and June 30, without prior written approval from the NMFS.

2.0 Waters Requiring Additional Notification

The Corps has identified waters that will be subject to additional notification requirements for activities authorized by all NWPs. These waters are:

2.1 Western NC Counties that Drain to Designated Critical Habitat

For proposed activities within waters of the United States that require a Pre-Construction Notification (PCN) and are located in the sixteen counties listed below, permittees must provide a copy of the PCN to the U.S. Fish and Wildlife Service (USFWS), 160 Zillicoa Street, Asheville, North Carolina 28801. This PCN must be sent concurrently to the U.S. Fish and Wildlife Service and the Corps Asheville Regulatory Field Office. Please see General Condition 18 for specific notification requirements related to the Endangered Species Act and the below website for information on the location of designated critical habitat.

Counties with tributaries that drain to designated critical habitat that require notification to the Asheville U.S. Fish and Wildlife Service: Avery, Cherokee, Forsyth, Graham, Haywood, Henderson, Jackson, Macon, Mecklenburg, Mitchell, Stokes, Surry, Swain, Transylvania, Union and Yancey.

Website and office addresses for Endangered Species Act Information:

The Wilmington District has developed the following website for permittees which provides guidelines on how to review linked websites and maps in order to fulfill NWP General Condition 18 requirements:
http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/AgencyCoordination/ESA.aspx

Permittees who do not have internet access may contact the appropriate U.S. Fish and Wildlife Service offices listed below or Corps at (910) 251-4633:

Asheville U.S. Fish and Wildlife Service Office counties: All counties west of and including Anson, Stanly, Davidson, Forsythe and Stokes Counties.

U.S. Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
Telephone: (828) 258-3939

Raleigh U.S. Fish and Wildlife Service Office counties: all counties east of and including Richmond, Montgomery, Randolph, Guilford, and Rockingham Counties.

U.S. Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726

Raleigh, NC 27636-3726
Telephone: (919) 856-4520

2.2 Special Designation Waters

Prior to the use of any NWP, except NWP 3, that involves a discharge of dredged or fill material in any of the following identified waters and/or adjacent wetlands in North Carolina, permittees shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32). The North Carolina waters and wetlands that require additional notification requirements are:

"Outstanding Resource Waters" (ORW) or "High Quality Waters" (HQW) as designated by the North Carolina Environmental Management Commission; "Primary Nursery Areas" (PNA), including inland PNA, as designated by the North Carolina Marine Fisheries Commission and the NCWRC; or wetlands adjacent to these waters. Definitions of ORW, HQW and PNA waters can be found in the North Carolina State Administrative Code, Title 15A, Subchapters 2B and 10C (15A NCAC 02B, 15A NCAC 10C) and at the following World Wide Web page: http://reports.oah.state.nc.us/ncac.asp?folderName=\Title%2015A%20-%20Environmental%20Quality&lookUpError=15A%20NCAC%20000%20. Surface water classifications for waters in North Carolina can be viewed at the North Carolina Division of Water Resources website or at the following World Wide Web Page: https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications

Permittees who do not have internet access may contact the Corps at (910) 251- 4633.

2.3 Coastal Area Management Act (CAMA) Areas of Environmental Concern

Non-federal permittees for any NWP in a designated "Area of Environmental Concern" (AEC) in the twenty (20) counties of Eastern North Carolina covered by the North Carolina Coastal Area Management Act (CAMA) must also obtain the required CAMA permit. Development activities for non-federal projects may not commence until a copy of the approved CAMA permit is furnished to the appropriate Wilmington District Regulatory Field Office (Wilmington Field Office – 69 Darlington Avenue, Wilmington, NC 28403, (910) 251-4802 or Washington Field Office – 2407 West 5th Street, Washington, NC 27889, (910) 251-4610).

2.4 Barrier Islands

Prior to the use of any NWP on a barrier island of North Carolina, permittees must submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32).

2.5 Mountain or Piedmont Bogs

Prior to the use of any NWP in a Bog, as classified by the North Carolina Wetland Assessment Methodology (NCWAM), permittees shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32). The latest version of NCWAM can be

viewed on the Corps RIBITS (Regulatory In-lieu Fee and Bank Information Tracking System) website or at the following World Wide Web Page: https://ribits.usace.army.mil/ribits_apex/f?p=107:27:0::NO:::

2.6 Animal Waste Facilities

Prior to use of any NWP for construction of animal waste facilities in waters of the United States, including wetlands, permittees shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32).

2.7 Trout Waters

Prior to any discharge of dredge or fill material into streams, waterbodies or wetlands within the 294 designated trout watersheds of North Carolina, the permittee shall submit a PCN (see General Condition 32) to the District Engineer prior to commencing the activity, unless other thresholds are established in the Regional Conditions in Section 4 (Additional Regional Conditions for Specific Nationwide Permits). The permittee shall also provide a copy of the notification to the appropriate NCWRC office, or to the EBCI FWM Office (if the project is located on EBCI trust land), to facilitate the determination of any potential impacts to designated Trout Waters.

Notification to the Corps will include a statement with the name of the NCWRC or EBCI FWM biologist contacted, the date of the notification, the location of work, a delineation of wetlands and waters, a discussion of alternatives to working in the mountain trout waters, why alternatives were not selected, and, if applicable, a plan to provide compensatory mitigation for all unavoidable adverse impacts to mountain trout waters.

NCWRC and NC Trout Watersheds:

NCWRC Contact**	**Counties that are entirely within Trout Watersheds***		**Counties that are partially within Trout Watersheds***	
Mountain Coordinator Balsam Depot 20830 Great Smoky Mountain Expressway Waynesville, NC 28786 Telephone: (828) 558-6011 For NCDOT Projects: NCDOT Coordinator 206 Charter. Street Albemarle, NC 28001 Telephone: (704) 982-9181	Alleghany Ashe Avery Graham Haywood	Jackson Macon Swain Transylvania Watauga	Burke Buncombe Caldwell Cherokee Clay Henderson Madison	McDowell Mitchell Polk Rutherford Surry Wilkes Yancey

*NOTE: To determine notification requirements, contact the Corps Asheville Regulatory Field Office at (828) 271-7980 or view maps for each County at the following World Wide Web page: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Trout/.

**If a project is located on EBCI trust land, submit the PCN in accordance with Section 3.14. Contact the Corps Asheville Regulatory Field Office at (828) 271-7980 with questions.

2.8 Western NC Waters and Corridors

The permittee shall submit a PCN (see General Condition 32) to the District Engineer prior to commencing the activity in waters of the United States if the activity will occur within any of the following identified waters in western North Carolina, within 0.5 mile on either side of these waters, or within 0.75 mile of the Little Tennessee River, as measured from the top of the bank of the respective water (i.e., river, stream, or creek):

Brasstown Creek
Burningtown Creek
Cane River
Caney Fork
Cartoogechaye Creek
Chattooga River
Cheoah River
Cowee Creek
Cullasaja River
Deep Creek
Ellijay Creek
French Broad River
Garden Creek
Hiwassee River
Hominy Creek
Iotla Creek
Little Tennessee River (within the river or within 0.75 mile on either side of this river)
Nantahala River
Nolichucky River
North Fork French Broad River
North Toe River
Nottley River
Oconaluftee River (portion not located on trust/EBCI land)
Peachtree Creek
Shooting Creek
Snowbird Creek
South Toe River
Stecoah Creek
Swannanoa River
Sweetwater Creek

Tuckasegee River (also spelled Tuckaseegee or Tuckaseigee)
Valley River
Watauga Creek
Watauga River
Wayah Creek
West Fork French Broad River

To determine notification requirements, contact the Corps Asheville Regulatory Field Office at (828) 271-7980 or view maps for all corridors at the following World Wide Web page: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Designated-Special-Waters.aspx

3.0 List of Corps Regional Conditions for All Nationwide Permits

The following conditions apply to all Nationwide Permits in the Wilmington District:

3.1 Limitation of Loss of Stream Bed

NWPs may not be used for activities that may result in the loss or degradation of more than 300 total linear feet of stream bed, unless the District Engineer has waived the 300 linear foot limit for ephemeral and intermittent streams on a case-by-case basis and has determined that the proposed activity will result in minimal individual and cumulative adverse impacts to the aquatic environment. Waivers for the loss of ephemeral and intermittent streams must be in writing and documented by appropriate/accepted stream quality assessments*. This waiver only applies to the 300 linear feet threshold for NWPs.

This Regional Condition does not apply to NWP 23 (Approved Categorical Exclusions).

*NOTE: Permittees should utilize the most current methodology prescribed by Wilmington District to assess stream function and quality. Information can be found at: https://ribits.usace.army.mil/ribits_apex/f?p=107:27:0::NO:::

3.2 Mitigation for Loss of Stream Bed

For any NWP that results in a loss of more than 150 linear feet of stream, the permittee shall provide a mitigation proposal to compensate for more than minimal individual and cumulative adverse impacts to the aquatic environment. For stream losses of 150 linear feet or less that require a PCN, the District Engineer may determine, on a case-by-case basis, that compensatory mitigation is required to ensure that the activity results in minimal adverse effect on the aquatic environment.

3.3 Pre-construction Notification for Loss of Streambed Exceeding 150 Feet

Prior to use of any NWP for any activity which impacts more than 150 total linear feet of perennial stream, intermittent or ephemeral stream, the permittee shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32). This applies to

NWPs that do not have specific notification requirements. If a NWP has specific notification requirements, the requirements of the NWP should be followed.

3.4 Restriction on Use of Live Concrete

For all NWPs which allow the use of concrete as a building material, live or fresh concrete, including bags of uncured concrete, may not come into contact with the water in or entering into waters of the United States. Water inside coffer dams or casings that has been in contact with wet concrete shall only be returned to waters of the United States after the concrete is set and cured and when it no longer poses a threat to aquatic organisms.

3.5 Requirements for Using Riprap for Bank Stabilization

For all NWPs that allow for the use of riprap material for bank stabilization, the following measures shall be applied:

3.5.1. Where bank stabilization is conducted as part of an activity, natural design, bioengineering and/or geoengineering methods that incorporate natural durable materials, native seed mixes, and native plants and shrubs are to be utilized to the maximum extent practicable.

3.5.2. Filter cloth must be placed underneath the riprap as an additional requirement of its use in North Carolina waters. The placement of filter fabric is not required if the riprap will be pushed or "keyed" into the bank of the waterbody. A waiver from the specifications in this Regional Condition may be requested in writing. The waiver will only be issued if it can be demonstrated that the impacts of complying with this Regional Condition would result in greater adverse impacts to the aquatic environment.

3.5.3. The placement of riprap shall be limited to the areas depicted on submitted work plan drawings.

3.5.4. The riprap material shall be clean and free from loose dirt or any pollutant except in trace quantities that would not have an adverse environmental effect.

3.5.5. It shall be of a size sufficient to prevent its movement from the authorized alignment by natural forces under normal conditions.

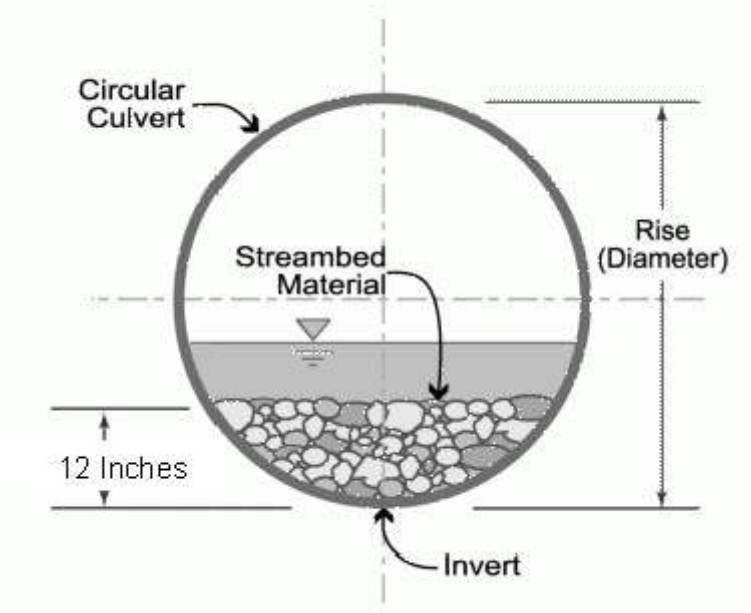
3.5.6. The riprap material shall consist of clean rock or masonry material such as, but not limited to, granite, marl, or broken concrete.

3.6 Requirements for Culvert Placement

3.6.1 For all NWPs that involve the construction/installation of culverts, measures will be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a pipe or culvert should not be modified by altering the width or depth of the stream profile in connection with the construction activity. The width, height, and gradient of a proposed culvert should be

sufficient to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow is the seasonal sustained high flow that typically occurs in the spring. Spring flows should be determined from gage data, if available. In the absence of such data, bank-full flow can be used as a comparable indicator.

In Public Trust Areas of Environmental Concern (AEC) and/or the Estuarine Waters AEC as designated by the Coastal Area Management Act (CAMA): All pipes/culverts must be sufficiently sized to allow for the burial of the bottom of the culvert at least one foot below normal bed elevation.



In all other areas: Culverts greater than 48 inches in diameter will be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter or less shall be buried to maintain aquatic passage and to maintain passage during drought or low flow conditions, and every effort shall be made to maintain the existing channel slope.

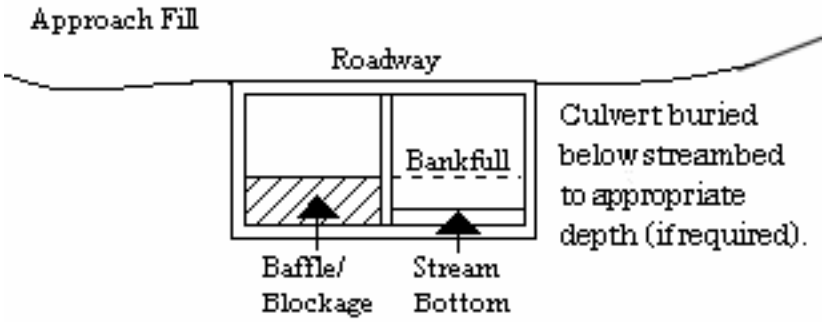
Culverts must be designed and constructed in a manner that minimizes destabilization and head cutting. Destabilizing the channel and head cutting upstream should be considered and appropriate actions incorporated in the design and placement of the culvert.

A waiver from the depth specifications in this condition may be requested, in writing, by the permittee and issued by the Corp; this request must be specific as to the reasons(s) for the request. The waiver will be issued if it can be demonstrated that the proposed design would result in less impacts to the aquatic environment.

All counties: Culverts placed within riparian and/or riverine wetlands must be installed in a manner that does not restrict the flow and circulation patterns of waters of the United States.

Culverts placed across wetland fills purely for the purposes of equalizing surface water do not have to be buried, but the culverts must be of adequate size and/or number to ensure unrestricted transmission of water.

3.6.2 Bank-full flows (or less) shall be accommodated through maintenance of the existing bank-full channel cross sectional area. Additional culverts or culvert barrels at such crossings shall be allowed only to receive bank-full flows.



3.6.3 Where adjacent floodplain is available, flows exceeding bank-full should be accommodated by installing culverts at the floodplain elevation. Additional culverts or culvert barrels at such crossings should not be buried, or if buried, must have sills at the inlets to ensure that they only receive flows exceeding bank-full.

3.6.4 Excavation of existing stream channels shall be limited to the minimum necessary to construct or install the proposed culvert. The final width of the impacted stream at the culvert inlet and outlet should be no greater than the original stream width. A waiver from this condition may be requested in writing; this request must be specific as to the reason(s) for the request. The waiver will be issued if the proposed design would result in less impacts to the aquatic environment and/or if it can be demonstrated that it is not practicable to restore the final width of the impacted stream at the culvert inlet and outlet to the width of the original stream channel.

3.6.5 The width of the culvert shall be comparable to the width of the stream channel. If the width of the culvert is wider than the stream channel, the culvert shall include baffles, benches and/or sills to maintain the width of the stream channel. A waiver from this condition may be requested in writing; this request must be specific as to the reason(s) for the request. The waiver will be issued if it can be demonstrated that it is not practicable or necessary to include baffles, benches or sills and the design would result in less impacts to the aquatic environment.

3.7 Notification to NCDEQ Shellfish Sanitation Section

Permittees shall notify the NCDEQ Shellfish Sanitation Section prior to dredging in or removing sediment from an area closed to shell fishing where the effluent may be released to an area open for shell fishing or swimming in order to avoid contamination from the disposal area and cause a temporary shellfish closure to be made. Such notification shall also be provided to the appropriate Corps Regulatory Field Office. Any disposal of sand to the ocean beach should occur between November 1 and April 30 when recreational usage is low. Only clean sand

should be used and no dredged sand from closed shell fishing areas may be used. If beach disposal were to occur at times other than stated above or if sand from a closed shell fishing area is to be used, a swimming advisory shall be posted, and a press release shall be issued by the permittee.

3.8 Submerged Aquatic Vegetation

Impacts to Submerged Aquatic Vegetation (SAV) are not authorized by any NWP, except NWP 48, unless EFH Consultation has been completed pursuant to the Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act). Permittees shall submit a PCN (See NWP General Condition 32) to the District Engineer prior to commencing the activity if the project would affect SAV. The permittee may not begin work until notified by the Corps that the requirements of the Magnuson-Stevens Act have been satisfied and that the activity is authorized.

3.9 Sedimentation and Erosion Control Structures and Measures

All PCNs will identify and describe sedimentation and erosion control structures and measures proposed for placement in waters of the United States. The structures and measures should be depicted on maps, surveys or drawings showing location and impacts to jurisdictional wetlands and streams.

3.10 Restoration of Temporary Impacts to Stream Beds

Upon completion of work that involves temporary stream impacts, streambeds are to be restored to pre-project elevations and widths using natural streambed material such that the impacted stream reach mimics the adjacent upstream and downstream reach. The impacted area shall be backfilled with natural streambed material to a depth of at least 12 inches or to the bottom depth of the impacted area if shallower than 12 inches. An engineered in-stream structure or material can be used to provide protection of a buried structure if it provides benefits to the aquatic environment and can be accomplished by a natural streambed design. A permittee may request a waiver of this condition if it is determined a buried structure needs significant physical protection beyond those provided in this condition. This condition does not apply to NWP 27 – Aquatic Habitat Restoration, Enhancement, and Establishment Activities.

3.11 Restoration of Temporary Impacts to Stream Banks

Upon completion of work involving temporary stream bank impacts, stream banks are to be restored to pre-project grade and contours or beneficial grade and contours if the original bank slope is steep and unstable. Natural durable materials, native seed mixes, and native plants and shrubs are to be utilized in the restoration. Natural designs which use bioengineered and/or geo-engineered methods are to be applied. An engineered structure or material can be used to provide protection of a buried structure if it provides benefits to the stream bank environment, provided it is not in excess of the minimum amount needed for protection and does not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark. A permittee may request a waiver of this condition if it is determined a buried structure

needs significant physical protection beyond those provided in this condition. This condition does not apply to NWP 27 – Aquatic Habitat Restoration, Enhancement, and Establishment Activities.

3.12 Federal Navigation Channel Setbacks and Corps Easements

3.12.1 Authorized structures and fills located in or adjacent to Federally authorized waterways will be constructed in accordance with the latest setback criteria established by the Wilmington District Engineer. You may review the setback policy at http://www.saw.usace.army.mil/Missions/Navigation/Setbacks.aspx. This general permit does not authorize the construction of hardened or permanently fixed structures within the Federally Authorized Channel Setback, unless the activity is approved by the Corps. The permittee shall submit a PCN (see General Condition 32) to the District Engineer prior to the construction of any structures or fills within the Federally Authorized Channel Setback.

3.12.2 The permittee shall obtain a Consent to Cross Government Easement from the Wilmington District's Land Use Coordinator prior to any crossing of the Corps easement and/or prior to commencing construction of any structures, authorized dredging or other work within the right-of-way of, or in proximity to, a federally designated disposal area. The Land Use Coordinator may be contacted at: CESAW-OP-N, 69 Darlington Avenue, Wilmington, North Carolina 28403-1343, email: SAWWeb-NAV@usace.army.mil

3.13 Northern Long-eared Bat – Endangered Species Act Compliance

The Wilmington District, U.S. Army Corps of Engineers has consulted with the United States Fish and Wildlife Service (USFWS) in regards to the threatened Northern long-eared bat (NLEB) (*Myotis septentrionalis*) and Standard Local Operating Procedures for Endangered Species (SLOPES) have been approved by the Corps and the USFWS. This condition concerns effects to the NLEB only and does not address effects to other federally listed species and/or federally designated critical habitat.

A. Procedures when the Corps is the lead federal* agency for a project:

The permittee must comply with (1) and (2) below when:

- the project is located in the western 41 counties of North Carolina, to include non-federal aid North Carolina Department of Transportation (NCDOT) projects, OR;

- the project is located in the 59 eastern counties of North Carolina, and is a non-NCDOT project.

*Generally, if a project is located on private property or on non-federal land, and the project is not being funded by a federal entity, the Corps will be the lead federal agency due to the requirement to obtain Department of the Army authorization to impact waters of the United States. If the project is located on federal land, contact the Corps to determine the lead federal agency.

(1) A permittee using a NWP must check to see if their project is located in the range of the NLEB by using the following website: http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf. If the project is within the range of the NLEB, or if the project includes percussive activities (e.g., blasting, pile driving, etc.), the permittee is then required to check the appropriate website in the paragraph below to discover if their project:

- is located in a 12-digit Hydrologic Unit Code area ("red HUC" - shown as red areas on the map), AND/OR;

- involves percussive activities within 0.25 mile of a red HUC.

Red HUC maps - for the western 41 counties in NC (covered by the Asheville Ecological Services Field Office), check the project location against the electronic maps found at: http://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html. For the eastern 59 counties in NC (covered by the Raleigh Ecological Services Field Office), check the project location against the electronic maps found at: https://www.fws.gov/raleigh/NLEB_RFO.html.

(2) A permittee must submit a PCN to the District Engineer, and receive written authorization from the District Engineer, prior to commencing the activity, if the activity will involve any of the following:

- tree clearing/removal, construction/installation of wind turbines in a red HUC, AND/OR;

- bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, (applies anywhere in the range of the NLEB), AND/OR:

- percussive activities in a red HUC, or within 0.25 mile of a red HUC.

The permittee may proceed with the activity without submitting a PCN to either the Corps or the USFWS, provided the activity complies with all applicable NWP terms and general and regional conditions, if the permittee's review under A.(1) and A.(2) above shows that the project is:

- located outside of a red HUC (and there are no percussive activities), and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;

- located outside of a red HUC and there are percussive activities, but the percussive activities will not occur within 0.25-mile of a red HUC boundary, and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;

- located in a red HUC, but the activity will NOT include: tree clearing/removal; construction/installation of wind turbines; bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, and/or; any percussive activities.

B. Procedures when the USACE is not the lead federal agency:

For projects where another federal agency is the lead federal agency - if that other federal agency has completed project-specific ESA Section 7(a)(2) consultation for the NLEB, and has (1) determined that the project would not cause prohibited incidental take of the NLEB, and (2) completed coordination/consultation that is required by the USFWS (per the directions on the respective USFWS office's website), that project may proceed without notification to either the USACE or the USFWS, provided all General and Regional Permit Conditions are met.

The NLEB SLOPES can be viewed on the USACE website at the following World Wide Web Page: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/ESA/. Permittees who do not have internet access may contact the USACE at (910) 251- 4633.

3.14 Work on Eastern Band of Cherokee Indians Land

All PCNs submitted for activities in waters of the United States on Eastern Band of Cherokee Indians (EBCI) trust land (i.e., Qualla Boundary and non-contiguous tracts of trust land), must comply with the requirements of the latest MOU between the Wilmington District and the Eastern Band of Cherokee Indians.

4.0 Additional Regional Conditions for Specific Nationwide Permits

4.1 NWP #12 - Utility Line Activities

4.1.1 Pipeline/utility line construction through jurisdictional waters and wetlands will be accomplished utilizing directional drilling/boring methods to the maximum extent practicable.

4.1.2 Temporary discharge of excavated or fill material into wetlands and waters of the United States will be for the absolute minimum period of time necessary to accomplish the work. Temporary discharges will be fully contained with appropriate erosion control or containment methods or otherwise such fills will consist of non-erodible materials.

4.1.3 The work area authorized by this permit, including temporary and/or permanent fills, will be minimized to the greatest extent practicable. Justification for work corridors exceeding forty (40) feet in width is required and will be based on pipeline diameter and length, size of equipment required to construct the utility line, and other construction information deemed necessary to support the request. The permittee is required to provide this information to the Corps with the initial notification package.

4.1.4 Excavated materials shall be returned to the excavated areas and any remaining materials shall be disposed of in uplands, unless the Corps authorizes disposal in waters of the United States**.**

4.1.5 In areas where a sub-aqueous utility line is to cross a federally-maintained channel, (i.e., the Atlantic Intracoastal Waterway [AIWW]), the line will be buried at least six (6) feet below the allowable overdepth of the authorized channel, including all side slopes. For areas outside federally-maintained channels, sub-aqueous lines must be installed at a minimum depth of two (2) feet below the substrate when such lines might interfere with navigation.

4.1.6 The minimum clearance*(see NOTE in 4.1.7) for aerial communication lines, or any lines not transmitting electrical power, will be ten (10) feet above the clearance required for nearby stationary bridges as established by the U.S. Coast Guard. In the event the U.S. Coast Guard has not established a bridge clearance, minimum vertical clearances for power and aerial lines will not be less than required by Section 23, Rule 232, of the latest revision of the National Electrical Safety Code (ANSI C2). Clearances will not be less than shown in Table 232-1, Item 7, ANSI C2.

4.1.7 The minimum clearance* for an aerial line, transmitting electrical power, is based on the low point of the line under conditions that produce the greatest sag, taking into consideration temperature, load, wind, length or span and the type of supports. The minimum clearance for an aerial electrical power transmission line crossing navigable waters of the United States, where there is an established bridge clearance established by the U.S. Coast Guard, shall be governed by the system voltage, as indicated below:

Nominal System Voltage, kilovolt	Minimum Clearance Above Bridge Clearance (As Established by the U.S. Coast Guard)
115 and below	20 feet
138	22
161	24
230	26
350	30
500	35
700	42
750 to 765	45

*NOTE: Minimum clearance is the distance measured between the lowest point of a stationary bridge, including ***any*** infrastructure attached to underside of the bridge, and the Mean High Water (MHW) of the navigable waters of the United States beneath the bridge.

4.1.8 On navigable waters of the United States, including all federal navigation projects, where there is no bridge for reference for minimum clearance, the proposed project will need to be reviewed by the Corps in order to determine the minimum clearance between the line and MHW necessary to protect navigational interests.

4.1.9 A plan to restore and re-vegetate wetland areas cleared for construction must be submitted with the required PCN. Cleared wetland areas shall be re-vegetated to the maximum extent practicable with native species of canopy, shrub, and herbaceous species. Fescue grass shall not be used.

4.1.10 Any permanently maintained corridor along the utility right of way within forested wetlands shall be considered a permanent impact. A compensatory mitigation plan will be required for all such impacts associated with the requested activity if the activity requires PCN and the cumulative total of permanent forested wetland impacts exceeds 1/10-acre, unless the District Engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal.

For permanent forested wetland impacts of 1/10-acre or less, the District Engineer may determine, on a case-by-case basis, that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment.

4.1.11 Use of rip-rap or any other engineered structures to stabilize a stream bed should be avoided to the maximum extent practicable. If riprap stabilization is needed, it should be placed only on the stream banks, or, if it is necessary to be placed in the stream bed, the finished top elevation of the riprap should not exceed that of the original stream bed.

4.1.12 When directional boring or horizontal directional drilling (HDD) under waters of the United States, including wetlands, permittees shall closely monitor the project for hydraulic fracturing or "fracking." Any discharge from hydraulic fracturing or "fracking" into waters of the United States, including wetlands, shall be reported to the appropriate Corps Regulatory Field Office within 48 hours. Restoration and/or compensatory mitigation may be required as a result of any unintended discharges.

4.1.13 For purposes of this NWP, the term utility line does not include pipes or culverts associated with driveways, roadways, lots, etc.

4.1.14 The permittee shall submit a PCN to the District Engineer prior to commencing the activity if the activity will involve the discharge of dredged or fill material into more than 1/10-acre of wetlands or 150 linear feet of stream channel for the construction of temporary access fills and/or temporary road crossings. The PCN must include a restoration plan that thoroughly describes how all temporary fills will be removed, describes how pre-project conditions will be restored, and includes a timetable for all restoration activities.

B.12
NCDEQ Sewer Permit

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
S. DANIEL SMITH
Director

NORTH CAROLINA
Environmental Quality

November 3, 2021

Elaina L. Ball, CEO/General Manager
Fayetteville Public Works Commission
955 Old Wilmington Rd.
Fayetteville, NC, 28301

Subject: Permit No. WQ0042336
Fayetteville Public Works Commission
Big Rockfish Creek Outfall – Contracts 2-4
Wastewater Collection System Extension Permit
Cumberland County

Dear Ms. Ball:

In accordance with your application received February 19, 2021, we are forwarding herewith Permit No. WQ0042336 dated November 3, 2021 to the Fayetteville PWC for the construction and operation upon certification of the subject wastewater collection system extension. This permit shall be effective from the date of issuance until rescinded, and shall be subject to the conditions and limitations as specified therein. This cover letter shall be considered a part of this permit and is therefore incorporated therein by reference.

Please pay particular attention to the following conditions contained within this permit:

Condition I.1: An alternative design is granted for the installation of portions of the gravity sewer permitted herein, in accordance with 15A NCAC 02T.0105(n). Documentation regarding the abandonment or relocation of wells shall be required at certification. Please see Condition I.1 for more details.

Condition II.1: This permit shall not be automatically transferable; a request must be made and approved.

Condition II.4: Requires that the wastewater collection facilities be properly operated and maintained in accordance with 15A NCAC 2T .0403 or any individual system-wide collection system permit issued to the Permittee.

Condition II.7: Upon completion of construction and prior to operation of these permitted facilities, the completed Engineering Certification form with checklist attached to this permit shall be submitted with the required supporting documents to the address provided on the form. **Permit modifications are required for any changes resulting in non-compliance with this permit, regulations, or the Minimum Design Criteria.** [15A NCAC 02T.0116]

It shall be responsibility of the Permittee to ensure that the as-constructed project meets the appropriate design criteria and rules. Failure to comply may result in penalties in accordance with North Carolina General Statute §143-215.6A through §143-215.6C, construction of additional or replacement

wastewater collection facilities, and/or referral of the North Carolina-licensed Professional Engineer to the licensing board.

If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing upon written request within 30 days following receipt of this permit. This request must be in the form of a written petition, conforming to Chapter 150B of North Carolina General Statutes, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

If you need additional information concerning this matter, please contact Danielle Simpson at (910) 433-3334 or via e-mail at danielle.simpson@ncdenr.gov.

Sincerely,

DocuSigned by:
Trent Allen
5189C2D3DD5C42B...

Trent Allen, Regional Supervisor
Water Quality Regional Operations Section
Fayetteville Regional Office
Division of Water Resources, NCDEQ

ec: Ben Latino, McKim & Creed, 1730 Varsity Drive, Venture IV Building, Ste. 500, Raleigh, NC, 27606
Laserfiche File

NORTH CAROLINA
Environmental Quality

WASTEWATER COLLECTION SYSTEM EXTENSION PERMIT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations, permission is hereby granted to

Fayetteville Public Works Commission
Cumberland County

for the construction and operation of approximately 8,680 linear feet of 8-inch gravity sewer, approximately 4,899 linear feet of 12-inch gravity sewer, approximately 10,934 linear feet of 18-inch gravity sewer, and approximately 11,184 linear feet of 24-inch gravity sewer to serve the Big Rockfish Creek Outfall – Contracts 2-4 project, and the discharge of 0 gallons per day of collected domestic wastewater to the Rockfish Creek Water Reclamation Facility existing sewerage system, pursuant to the application received February 19, 2021, and in conformity with 15A NCAC 2T; the Division's Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting data subsequently filed and approved by the Department of Environmental Quality and considered a part of this permit.

This permit shall be effective from the date of issuance until rescinded and shall be subject to the specified conditions and limitations contained therein.

DocuSigned by:
Trent Allen
5189C2D3DD5C42B...

Trent Allen, Regional Supervisor
Division of Water Resources, NCDEQ
By Authority of The Environmental Management Commission

Permit Number: **WQ0042336**
Permit Issued: **November 3, 2021**

SUPPLEMENT TO PERMIT COVER SHEET

Fayetteville Public Works Commission is hereby authorized to:

Construct, and then operate upon certification the aforementioned wastewater collection extension. The sewage and wastewater collected by this system shall be treated in the Rockfish Creek Water Reclamation Facility in accordance with Permit Number NC0050105.

Permitting of this project does not constitute an acceptance of any part of the project that does not meet 15A NCAC 2T; the Division's Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; and the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable, unless specifically mentioned herein. Division approval is based on acceptance of the certification provided by a North Carolina-licensed Professional Engineer in the application. It shall be the Permittee's responsibility to ensure that the as-constructed project meets the appropriate design criteria and rules.

Special Condition Language:

Condition I.1: Per the submitted variance request as received on February 19, 2021, by McKim & Creed, Inc. on behalf of the Fayetteville Public Works Commission for the subject project, with additional information received August 23, 2021, and September 3, 2021, the Division will grant the variance request in accordance with the provisions for alternative designs in 15A NCAC 02T.0105(n), subject to the following conditions:

- As specified in the provided plans, where the gravity sewer is within 100 feet of existing private wells; the materials, testing methods, and acceptability standards meeting water main standards (15A NCAC 18C) shall be specified, per 15A NCAC 02T.0305(g).
- As specified in the provided plans, where manholes are within 100 feet of a public or private well, the following criteria is required:
    1. Manholes shall be provided with a watertight frame and cover with gasket.
    2. All manhole seams shall be externally taped/sealed.
    3. Manholes shall be provided with a full waterproof interior coating/lining.
    4. Watertight pipe connections shall be provided consisting of a flexible rubber boot or compression type connector.
    5. All manholes shall be tested in accordance with ASTM C1224.
    6. "Dog house" type manholes shall not be used.
    7. All manholes not included as part of a USACOE 404 Permit or Division 401 Certification shall maintain a separation of no less than 10 feet from wetlands.
- The minimum separation for any portion of the sewer system shall not be less than 25 feet from a private well or 50 feet from a public well.
- For any wells being abandoned or relocated as part of the project and as shown on the provided plans, documentation from an appropriately certified professional shall be provided with the engineer's certification documents to demonstrate that the wells have been abandoned/relocated as applicable.

  Regardless of the variance approval, in the event that the wastewater collection facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by this Division, such as the construction of additional or replacement facilities.

All other elements of this project shall be constructed in accordance with all applicable rules and statues including, 15A NCAC 2T; the Division of Water Resources' (Division) Gravity Sewer Minimum Design Criteria adopted February 12, 1996, as applicable; and the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000, as applicable. Approval of the variance request does not constitute approval of the permit.

Condition I.2: As specified in the provided plans, where the gravity sewer is within 50 feet of wetlands associated with Class B waters; the materials testing methods, and acceptability standards meeting water main standards (15A NCAC 18C) shall be specified, per 15A NCAC 02T.0305(g).

- As specified in the provided plans, where manholes are within 50 feet from wetlands, the criteria specified in Condition I.1 are required.

II. STANDARD CONDITIONS

1. This permit shall not be transferable. In the event there is a desire for the wastewater collection facilities to change ownership, or there is a name change of the Permittee, a formal permit request shall be submitted to the Division accompanied by documentation from the parties involved, and other supporting materials as may be appropriate. The approval of this request shall be considered on its merits and may or may not be approved. [15A NCAC 02T.0104; G.S 143-215.1(d3)]

2. This permit shall become voidable unless the wastewater collection facilities are constructed in accordance with the conditions of this permit; 15A NCAC 2T; the Division's Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting materials unless specifically mentioned herein. [15A NCAC 02T.0110]

3. This permit shall be effective only with respect to the nature and volume of wastes described in the application and other supporting data. [15A NCAC 02T .0110]

4. The wastewater collection facilities shall be properly maintained and operated at all times. The Permittee shall maintain compliance with an individual system-wide collection system permit for the operation and maintenance of these facilities as required by 15A NCAC 2T .0403. If an individual permit is not required, the following performance criteria shall be met: [15A NCAC 02T .0108(b)]:

   a. The sewer system shall be effectively maintained and operated at all times to prevent discharge to land or surface waters, and to prevent any contravention of groundwater standards or surface water standards.

   b. A map of the sewer system shall be developed and shall be actively maintained.

   c. An operation and maintenance plan including pump station inspection frequency, preventative maintenance schedule, spare parts inventory and overflow response has been developed and implemented.

d. Pump stations that are not connected to a telemetry system shall be inspected every day (i.e. 365 days per year). Pump stations that are connected to a telemetry system shall be inspected at least once per week.

e. High-priority sewer lines shall be inspected at least once per every six-months and inspections are documented.

f. A general observation of the entire sewer system shall be conducted at least once per year.

g. Overflows and bypasses shall be reported to the appropriate Division regional office in accordance with 15A NCAC 2B .0506(a), and public notice shall be provided as required by North Carolina General Statute §143-215.1C.

h. A Grease Control Program is in place as follows:

   1. For public owned collection systems, the Grease Control Program shall include at least biannual distribution of educational materials for both commercial and residential users and the legal means to require grease interceptors at existing establishments. The plan shall also include legal means for inspections of the grease interceptors, enforcement for violators and the legal means to control grease entering the system from other public and private satellite sewer systems.

   2. For privately owned collection systems, the Grease Control Program shall include at least bi-annual distribution of grease education materials to users of the collection system by the permittee or its representative.

   3. Grease education materials shall be distributed more often than required in Parts (1) and (2) of this Subparagraph if necessary to prevent grease-related sanitary sewer overflows.

i. Right-of-ways and easements shall be maintained in the full easement width for personnel and equipment accessibility.

j. Documentation shall be kept for Subparagraphs (a) through (i) of this Rule for a minimum of three years with exception of the map, which shall be maintained for the life of the system.

5. The Permittee shall report by telephone to a water resources staff member at the Fayetteville Regional Office, telephone number (910) 433-3300, as soon as possible, but in no case more than 24 hours, following the occurrence or first knowledge of the occurrence of either of the following:

   a. Any process unit failure, due to known or unknown reasons, that renders the facility incapable of adequate wastewater transport, such as mechanical or electrical failures of pumps, line blockage or breakage, etc.; or
   b. Any SSO and/or spill over 1,000 gallons; or
   c. Any SSO and/or spill, regardless of volume, that reaches surface water

   Voice mail messages or faxed information is permissible, but this shall not be considered as the initial verbal report. Overflows and spills occurring outside normal business hours may also be reported to the Division of Emergency Management at telephone number (800) 858-0368 or (919) 733-3300. Persons reporting any of the above occurrences shall file a spill report by completing and submitting Part I of Form CS-SSO (or the most current Division approved form) within five days following first knowledge of the occurrence. This report must outline the actions taken or proposed to be taken to ensure that the problem does not recur. Part II of Form CS-SSO (or the most current Division approved form) can also be completed to show that the SSO was beyond control. [G.S. 143-215.1C(a1)]

6. Construction of the gravity sewers, pump stations, and force mains shall be scheduled so as not to interrupt service by the existing utilities nor result in an overflow or bypass discharge of wastewater to the surface waters of the State. [15A NCAC 02T.0108(b)]

7. Upon completion of construction and prior to operation of these permitted facilities, the completed Engineering Certification form with checklist attached to this permit shall be submitted with the required supporting documents to the address provided on the form. A complete certification is one where the form is fully executed and the supporting documents are provided as applicable. Any wastewater flow made tributary to the wastewater collection system extension prior to completion of this Engineer's Certification shall be considered a violation of the permit and shall subject the Permittee to appropriate enforcement actions.

   If the permit is issued to a private entity with an Operational Agreement, then a copy of the Articles of Incorporation, Declarations/Covenants/Restrictions, and Bylaws that have been appropriately filed with the applicable County's Register of Deeds office shall be submitted with the certification.

   A complete certification is one where the form is fully executed and the supporting documents are provided as applicable. Supporting documentation shall include the following:

   a. One copy of the project construction record drawings (plan & profile views of sewer lines & force mains) of the wastewater collection system extension. Final record drawings should be clear on the plans or on digital media (CD or DVD disk) and are defined as the design drawings that are marked up or annotated with after construction information and show required buffers, separation distances, material changes, etc.

   b. One copy of the supporting applicable design calculations including pipe and pump sizing, velocity, pump cycle times, and level control settings, pump station buoyancy, wet well storage, surge protection, detention time in the wet well, and force main, ability to flush low points in force mains with a pump cycle, and downstream sewer capacity analysis. If a portable power source or pump is dedicated to multiple stations, an evaluation of all the pump stations' storage capacities and the rotation schedule of the portable power source or pump, include travel timeframes, shall be provided.

   c. Changes to the project that do not result in non-compliance with this permit, regulations, or the Minimum Design Criteria should be clearly identified on the record drawings, on the certification in the space provided, or in written summary form.

   Prior to Certification (Final or Partial): **Permit modifications are required for any changes resulting in non-compliance with this permit (including pipe length changes of 10% or greater, increased flow, pump station design capacity design increases of 5% or greater, and increases in the number/type of connections), regulations, or the Minimum Design Criteria.** Requested modifications or variances to the Minimum Design Criteria will be reviewed on a case-by-case basis and each on its own merit. Please note that variances to the Minimum Design Criteria should be requested and approved during the permitting process prior to construction. After-construction requests are discouraged by the Division and may not be approved, thus requiring replacement or repair prior to certification & activation. [15A NCAC 02T .0116]

8. Gravity sewers installed greater than ten percent below the minimum required slope per the Division's Gravity Sewer Minimum Design Criteria shall not be acceptable and shall not be certified until

corrected. If there is an unforeseen obstacle in the field where all viable solutions have been examined, a slope variance can be requested from the Division with firm supporting documentation. This shall be done through a permit modification with fee. Such variance requests will be evaluated on a case-by-case basis. Resolution of such request shall be evident prior to completing and submitting the construction certification. [15A NCAC 02T.0105(n)]

9. A copy of the construction record drawings shall be maintained on file by the Permittee for the life of the wastewater collection facilities. [15A NCAC 02T .0116]

10. Failure to abide by the conditions and limitations contained in this permit; 15A NCAC 2T; the Division's Gravity Sewer Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Station and Force Mains adopted June 1, 2000 as applicable; and other supporting materials may subject the Permittee to an enforcement action by the Division, in accordance with North Carolina General Statutes §143-215.6A through §143-215.6C, construction of additional or replacement wastewater collection facilities, and/or referral of the North Carolina-licensed Professional Engineer to the licensing board. [15A NCAC 02T .0104; 15A NCAC 02T .0108(b-c)]

11. In the event that the wastewater collection facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by this Division, such as the construction of additional or replacement facilities. [15A NCAC 02T .0110; 15A NCAC 02T .0108(b)]

12. The issuance of this permit shall not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by the Division any other Federal, State, or Local government agencies which have jurisdiction or obtaining other permits which may be required by the Division or any other Federal, State, of Local government agencies. [G.S. 143-215.1(b)]

CERTIFICATION CHECKLIST

To be completed by the certifying engineer prior to operation of the permitted sewers, per 15A NCAC 02T.0116.

Certifying Engineer: _____

Certification Review Date: _____

Project Name: _____

WQ00_____ Project County: _____

1) Has permittee information changed since the permit was issued (or last modified): change of mailing address, change of ownership, transfer from developer to HOA/POA, etc. ☐ Yes ☐ No

   - If yes, please provide either a change of ownership form or new contact information. Note that transfer of permits from the developer to the HOA/POA must occur with the first certification.

2) Have the as-built drawings have been signed, sealed, and dated by an N.C. PE? ☐ Yes ☐ No

3) Final Engineering certification? ☐ Yes ☐ No

   - **If Partial Engineering certification, provide detailed narrative including what is being certified in the current phase, what was previously certified (if applicable), and what is left to be certified.**

4) Adequate information related to sewer lines: ☐ Yes ☐ No ☐ N/A

   - Three feet minimum cover has been provided for all sewers unless ferrous pipe was installed.
   - Minimum diameters for gravity sewers are 8-inches for public lines and 6-inches for private lines.
   - Manholes have been installed: At the end of each line, at all changes in grade, size, or alignment, at all intersections, and at distances not greater than 425 feet; minimum diameter shall be 4 feet (48-inches).

5) Adequate information related to pump stations: ☐ Yes ☐ No ☐ N/A

   - Ensure power reliability option was selected per 15A NCAC 02T.0305(h).

6) Was project construction completed in accordance with all of the following: ☐ Yes ☐ No ☐ N/A

   - 15A NCAC 02T, Minimum Design Criteria (MDC) for the permitting of Gravity Sewers (latest version), and MDC for the Permitting of Pump Stations and Force Mains (latest version)?

If not, a variance approval is required in accordance with 15A NCAC 02T.0105(b), **prior to certification and operation.**

- Contact the Central Office to discuss the variance to determine a course of action.
- Applicant must submit two copies of the variance request form, plans, specifications, calculations, and any other pertinent information to the Central Office (one hard copy, one digital copy).
- The central office will review the variance request, and if approvable, specific language regarding the variance will be incorporated into the permit, either via a special condition or a supplementary letter. A copy of the reissued permit with variance language or the variance letter must be maintained with the original documents.

7) Does the project contains high priority lines (15A NCAC 02T .0402(2))? ☐ Yes ☐ No

   - If yes, ensure that the permit already contains the necessary condition related to high priority lines 15A NCAC 02T.0403 (a)(5). If the permit does not include this language, the Fast Track reviewer will reissue the permit with the appropriate language.

8) Are Permit modifications are required for any changes resulting in non-compliance with this permit (including but not limited to pipe length changes of 10% or greater, change in flow, pump station design capacity design change of 5% or greater, and/or change in the number/type of connections)? ☐ Yes ☐ No

   - If yes, a permit modification request must be submitted to the appropriate Regional Office, and **a modified permit with revised certification must be issued prior to certification and operation**.

PERMITTEE: Fayetteville Public Works Commission
PERMIT #: WQ0042336
PROJECT: Big Rockfish Creek Outfall – Contracts 2-4
ISSUE DATE: November 3, 2021

This project shall not be considered complete nor allowed to operate in accordance with Condition 7 of this permit until the Division has received this Certification and all required supporting documentation. It should be submitted in a manner that documents the Division's receipt. Send the required documentation the Regional Supervisor, Water Quality Regional Operations Section at the address at the bottom.

Any wastewater flow made tributary to the wastewater collection system extension prior to completion of this Certification shall be considered a violation of the permit and shall subject the Permittee to appropriate enforcement actions. The Permittee is responsible for tracking all partial certifications up until a final certification is received. A Final Certification shall be a complete set of record drawings and design calculations regardless of whether partials have been submitted.

PERMITTEE'S CERTIFICATION

I, the undersigned agent for the Permittee, hereby state that this project has been constructed pursuant to the applicable standards & requirements, the Professional Engineer below has provided applicable design/construction information to the Permittee, and the Permittee is prepared to operate & maintain the wastewater collection system permitted herein or portions thereof.

_____	_____	_____
Printed Name, Title	Signature	Date

ENGINEER'S CERTIFICATION

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (☐ periodically, ☐ weekly, ☐ full time) the construction of the project name and location as referenced above for the above Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance of this permit; 15A NCAC 02T; the Division of Water Resources' (Division) Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting materials.

North Carolina Professional Engineer's Seal w/signature & date:

☐ **Final** ☐ **Partial (include description)**

Certification Comments/Qualifiers (attach if necessary):

B.13
NCDOT Temporary Driveway Permits
Not included

B.13.1
Camden Road
(Northside)

B.13.2
Camden Road
(Southside)

B.13.3
Waldos Beach Road3

B.14
NCDOT Permanent Driveway Permits
Not included

B.14.1
Lakeview Drive No. 1

B.14.2
Lakeview Drive No. 2

B.14.3
Lake Farm Rd

B.14
Division of Water Infrastructure
Authority to Bid
Not included

B.15
NCDEQ Findings of No Significant Impact

FINDING OF NO SIGNIFICANT IMPACT
AND ENVIRONMENTAL ASSESSMENT

FAYETTEVILLE PUBLIC WORKS COMMISSION
BIG ROCKFISH CREEK SANITARY SEWER OUTFALL AND LIFT STATION ELIMINATION

RESPONSIBLE AGENCY: NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

CONTACT: JON RISGAARD, SECTION CHIEF
STATE REVOLVING FUND SECTION
DIVISION OF WATER INFRASTRUCTURE
1633 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1633
(919) 707-9175

August 10, 2020

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FINDING OF NO SIGNIFICANT IMPACT

Article I, Chapter 113A of the North Carolina General Statutes requires an action to be subject to the requirements of the North Carolina Environmental Policy Act (NCEPA) if it involves the expenditure of public funds and if a potential impact is anticipated to the environment. The project has been evaluated for compliance with the NCEPA and is determined to be a major agency action, which will affect the environment.

Project Applicant:	Fayetteville Public Works Commission, North Carolina
Project Description:	The proposed project will install a new gravity sewer outfall consisting of approximately 22,900 linear feet (LF) of 24-inch sewer pipe and 10,850 LF of 18-inch sewer pipe to serve areas being annexed by the City of Fayetteville. Six existing lift stations will be abandoned and re-routed to the outfall with 5,650 LF of 12-inch and 8,600 LF of 8-inch gravity sewer.
Project Number:	CS370434-15 CS370434-16
Project Cost:	$32,891,448
Clean Water State Revolving Loan Fund:	$6,255,105 for CS370434-15 $16,162,109 for CS370434-16
Local Funds:	$10,474,234

The review process indicated that significant adverse environmental impacts should not occur if mitigative measures are implemented, and an environmental impact statement will not be required. The decision was based on information in the Engineering Report/Environmental Information Document (ER/EID) submitted by the applicant and reviews by governmental agencies. The attached Environmental Assessment (EA), prepared by the Division based on the ER/EID, supports this action and outlines mitigative measures that must be followed. This Finding of No Significant Impact (FONSI) completes the environmental review record, which is available for inspection at the State Clearinghouse.

No administrative action will be taken on the proposed project for at least 30 days after notification that the FONSI has been published in the North Carolina Environmental Bulletin.

Sincerely,

Jon Risgaard

Jon Risgaard, Section Chief
State Revolving Fund Section
Division of Water Infrastructure

ENVIRONMENTAL ASSESSMENT

A. Proposed Facilities and Actions

The Fayetteville Public Works Commission (PWC) is obligated to provide sewer service to communities annexed by the City of Fayetteville. The proposed project, located in southwest Cumberland County, will install a new gravity sewer outfall along Rockfish Creek and Stewart's Creek consisting of approximately 22,900 linear feet (LF) of 24-inch sewer pipe and 10,850 LF of 18-inch sewer pipe to serve annexed communities in and around the southwest portion of the City of Fayetteville. The proposed outfall will pass six neighborhoods, each currently served by a small lift station. The project will abandon these six existing lift stations by installing 5,650 LF of 12-inch and 8,600 LF of 8-inch gravity sewer to reroute flow to the new outfall. The new outfall and gravity sewer lines are expected to include a total 83 four-foot diameter and 45 five-foot diameter manholes. The outfall will include a permanent maintenance easement 30 feet wide and an additional 15 to 20 feet temporary easement for construction.

Funding Status: The estimated total cost for the project is $32,891,448. The PWC is applying for Clean Water State Revolving Fund (CWSRF) loans totaling $22,417,214 ($6,255,105 under project number CS370434-15 and $16,162,109 under project number CS370434-16). Local funds, including bonds, will be used to cover the remaining $10,474,234. The PWC intends to apply for an additional CWSRF loan of $10,025,890 in a future funding round, which will offset some of the local funds if awarded. With a third loan, the total project cost would increase to $33,091,966 due to closing costs for the additional loan.

B. Existing Environment

Topography and Soils. Fayetteville in the Sandhills region of the Coastal Plain physiographic province. The topography of the project area is level to gently sloping with elevations ranging from approximately 92 to 160 feet above mean sea level. Geologic units in the project area include the Cape Fear Formation, which consists of sandstone and sandy mudstone; the Black Creek Formation, which is characterized by lignitic clay with thin beds of fine-grained micaceous sand and thick lenses of cross-bedded sand; and the Middendorf Formation including fluvial-deltaic sands, sandstone, mudstone, and clay. Portions of the proposed alignment are in the 100-year floodplain and floodway.

The dominant soil types in the project area include Blaney loamy sands with eight to 15 percent slopes and Baymeade fine sand with two to eight percent slopes. These are deep, well-drained soils typically associated with marine terraces, hills, and flats. Torhunta and Lyn Haven soils, which are poorly drained and hydric soils, are also common.

Surface Water. The project area is located in the Upper Cape Fear River Basin (HUC 03030004). Surface waters in the project areas include Stewarts Creek, which has a Class C designation and no impairments, and Rockfish Creek, which is designated Class B and has no impairments.

Water Supply. Most of the project corridor relies on private wells and is not serviced by public drinking water. PWC does provide drinking water service to the six neighborhood lift station

areas, with water drawn from the Cape Fear River or Glenville Lake Aquifer. A portion of the project corridor is served by Aqua NC, which utilizes deep wells.

C. Existing Wastewater Facilities

The area to be served by the proposed project does not currently have sewer service and relies on private septic systems. PWC's sewer sub-basin RF-19 that will receive flow from the proposed outfall includes 179,463 LF of sewer line ranging from 6-inch to 24-inch diameter, 870 manholes, and two of the neighborhood lift stations that will be abandoned. The other four lift stations to be abandoned are in an adjacent sewer sub-basin along the route. These six lift stations have capacities ranging from five gallons per minute (gpm) to 1,000 gpm. An additional 1,500 gpm lift station is in a nearby sewer sub-basin and will remain in operation. Sub-basin RF-19 has experienced 11 sanitary sewer overflow (SSO) events in the past five years. Hurricane Matthew contributed to two of the SSO events. The others were attributed to debris or grease in cleanouts, third party damage, and equipment failures. The proposed outfall will tie into an existing 18-inch gravity sewer line. The collection system feeds into the main Rockfish Outfall and conveys wastewater to PWC's Rockfish Creek Wastewater Treatment Plant (WWTP).

D. Need for Proposed Facilities and Actions

The PWC is obligated to provide sewer service in the project area as part of the annexation agreement. These areas are currently unsewered. By extending sewer service, the project will replace septic systems that will eventually fail if left in place. The project will also allow for future service to other unserved or underserved areas in southwestern Cumberland County and eastern Hoke County. Replacing the six neighborhood lift stations with gravity sewer will improve reliability of the overall sewer collection system.

E. Alternatives Analysis

No-Action Alternative: In this alternative, nothing would be constructed, and the PWC's sewer system would continue operating as it normally does. This alternative is rejected because it does not address PWC's obligation to provide sewer service to recently annexed areas.

Regional Lift Station Alternative: This alternative would include a regional lift station and approximately 10,000 LF of 12-inch forcemain to convey collected sewage to the existing gravity sewer system. This alternative would have similar environmental impacts and life cycle cost as the preferred alternative, but the regional pump station would be less reliable than a gravity sewer outfall. In addition, this alternative would not allow for removal of the six existing neighborhood lift stations. This alternative is rejected due to the reduced reliability of the regional lift station and because the six neighborhood lift stations would remain in place, also reducing overall system reliability compared to the preferred alternative.

Construction of Sanitary Sewer Outfall: This alternative will construct a gravity sewer outfall to convey wastewater from the annexed areas for which PWC is required to provide sewer service. The outfall will include approximately 22,900 LF of 24-inch gravity sewer and 10,850 LF of 18-inch gravity sewer. This alternative will also abandon six neighborhood lift stations and tie them

into the proposed outfall. The proposed outfall alignment will parallel Stewarts Creek to Upchurches Pond and then follow Rockfish Creek to the tie-in with existing gravity sewer. This alternative is preferred because it meets PWC's obligation to provide sewer service to annexed areas, provides a means for future sewer service to underserved areas and future development with minimal environmental impact, has life cycle cost similar to other options, and removes lift stations to improve overall system reliability.

F. Environmental Consequences and Mitigative Measures

Topography and Soils: Construction will have minimal and mostly temporary impacts to topography and soils. Impacted areas will be returned to preconstruction elevations. Portions of the outfall will be constructed in floodplains and floodways. A Floodplain Development Permit will be obtained from Cumberland County before any construction in Special Flood Hazard Areas begins. Soil loss during construction will be minimized by following a DEQ-approved Erosion and Sedimentation Control Plan. The trench for the sewer lines will be excavated and backfilled within the same day, with suitable soils returned to their original locations on the route. Contactors will temporarily stabilize and seed the project area as the project progresses, with permanent stabilization upon completion.

Land Use: Impacts to land use are not expected to be significant. The proposed alignment is primarily located within private property adjacent to Stewarts Creek and Big Rockfish Creek. Temporary easements are needed for construction of the project area, with smaller permanent easements needed for a maintenance corridor. Areas outside of the maintenance corridor will be returned to preconstruction condition and use. Although the project is intended to service existing residential areas, construction of new sewer lines has the potential to induce population growth. Impacts from any future growth will be minimized through Cumberland County's Land Use Plan, which will manage growth and conserve natural and cultural resources.

Wetlands: Significant impacts to wetlands are not anticipated. Permanent impacts will be approximately 4.75 acres due to wetland forest clearing for maintenance corridors. Such areas will be converted from palustrine forest to palustrine emergent vegetation. An additional 1.97 acres of temporary impacts are anticipated. Construction staging areas will be outside of wetlands. Excavated materials will be returned to restore pre-construction elevations. If required, mitigation credits for permanent wetland impacts will be purchased from the Division of Mitigation Services or an existing private mitigation bank. Appropriate permits, including Nationwide 12 Authorization or individual U.S. Army Corps of Engineers 404 and 401 Water Quality Certification, will be obtained as required. Any future development will be required to adhere to buffer requirements in accordance with Cumberland County and City of Fayetteville development ordinances.

Important Farmlands: Significant impacts to important farmlands are not anticipated. The project area includes some designated prime and unique farmland soils, but these areas are not currently in farm use. Impacts to such areas will be temporary, with soils returned to original position and elevation after construction of the sewer lines.

Public Lands and Scenic, Recreational, and State Natural Areas: There are no formally designated public lands, scenic, recreational, or state natural areas in the project area or service area; thus no impacts are anticipated.

Cultural Resources: Upon request of the North Carolina State Historic Preservation Office (SHPO), a comprehensive Phase 1 archaeological survey was conducted. Preliminary research by SHPO had noted one previously recorded site in the vicinity of the survey areas, but the site was not identified during the survey, and its location is in doubt. The survey did record one newly identified site. This unknown prehistoric isolated find is not recommended as eligible for the National Register of Historic Places (NHRP). Based on the survey, no significant archaeological resources will be impacted by the proposed project. SHPO accepted the survey report as final and complete (September 17, 2019, ER 18-0126).

Air Quality: No significant impacts to air quality are anticipated. Construction activities may cause a slight increase in particulates from land clearing and exhaust clearing. Proper vehicle maintenance, wetting of exposed soil, and prompt stabilization will minimize impacts. All construction equipment will be properly equipped with emission controls. Any open burning for will be in compliance with all regulations. Sewer vents may emit some nuisance odors, but odor controls will be incorporated into the project design, including activated carbon manhole inserts or similar methods. Urban growth many contribute to increased air pollutant emissions from vehicles, traffic, and industrial activities. Mitigation for air impacts is primarily addressed at the state and federal level, but local development incentives promoting cluster development and multi-use development may help reduce miles traveled per person and reduce associated vehicle emissions.

Noise Levels: No significant permanent noise impacts are anticipated. Construction activities will be limited to Monday through Friday from 7:00 AM to 6:00 PM. Construction noise will be temporary and mostly confined to the immediate construction area. Operation of the underground infrastructure will not contribute to noise levels. Noise impacts from future growth will be minimized through planning and zoning impacts, buffers, and noise barriers where needed.

Water Resources: No significant impacts to water resources are anticipated. Impacts from construction activities will be mitigated through use of a DEQ-approved Erosion and Sedimentation Control Plan and adherence to permit and buffer requirements from the Division of Water Resources and U.S. Army Corps of Engineers. Stream crossings will be installed with open cuts during low flow conditions to minimize impacts. The project will remove older septic systems, possibly removing a source of stream and groundwater pollution. Any future development will be required to adhere to buffer requirements in accordance with Cumberland County and City of Fayetteville development ordinances.

Forest Resources: Some clearing will be required within permanent easements for the maintenance corridor. These permanent impacts will total approximately 34.42 acres. Clearing in temporary easements will be kept to a minimum. Trees not intended for removal will be protected from unnecessary cutting, breaking, or skinning. Care will be taken to avoid damage to

vegetation outside of easements. Unintended damage will be repaired or replaced, when practicable. Impacts to local forestry and agriculture production are not anticipated.

Shellfish or Fish and Their Habitats: Significant impacts to shellfish, fish, and their habitats are not expected. Big Rockfish Creek and Stewarts Creek do provide habitat for aquatic life, but no threatened and endangered species are present. Impacts from land disturbance will be minimized through silt fence, rock check dams, silt sack inlet protection, concrete washouts, temporary gravel construction entrances, and adherence to an approved Erosion and Sedimentation Control Plan. Vegetated buffers will be maintained to the maximum extent practicable. The minimum buffer along Big Rock Fish Creek is 50 feet, and the minimum buffer on Stewarts Creek is 75 feet. Most stream crossings are perpendicular to minimize buffer disturbance. Directional drilling is not practical for maintaining grade on a long gravity sewer installation, so open cut stream crossing will be utilized but will be done when water levels are low and stream flow is minimal to reduce impacts to aquatic species. Recommendations from the NC Wildlife Guidance Memorandum will be followed to minimize secondary and cumulative impacts.

Wildlife and Natural Vegetation: No significant impacts to wildlife and natural vegetation are expected. The project areas do not include habitat for any threatened and endangered species. Impacts to wildlife and natural vegetation will be minimized by keeping clearing and grubbing for temporary easements to a minimum, with care taken to avoid disturbance outside of easement limits. Disturbed areas will be re-seeded and stabilized in accordance with permits from the DEQ's Division of Energy, Minerals, and Land Resources

Introduction of Toxic Substances: The project is not expected to introduce toxic substances into the environment. Dumping of chemicals, fuels, lubricants, raw sewage, and other waste will be prohibited. Contractors will be required to take precautions to prevent pollution of areas in and adjacent to the project and minimize the generation of waste.

The U.S. Fish and Wildlife Service reviewed the proposed project and concluded that the requirements of Section 7(a)(2) of the Endangered Species Act have been fulfilled (February 16, 2018). The North Carolina Wildlife Resources Commission, Natural Heritage Program, and DWR Fayetteville Regional Office concur with the proposed project. The U.S. Army Corps of Engineers was consulted and did not object to the project. The North Carolina Department of Natural and Cultural Resources is not aware of historic resources that would be affected by the project (September 17, 2019, ER 18-0126).

G. Public Participation, Sources Consulted

A public meeting was held on July 22, 2020 via videoconference due to the COVID-19 pandemic, including a presentation about the project. Commissioners and council members asked several questions summarized with responses as follows:

- Comment: Is the gravity outfall newer technology than was available when the six lift stations to be replaced were installed?

  Response: Gravity sewers have been around for a very long time. Technology, materials, and installation methods have changed. Pre-annexation population

density in the area might have made the lift stations a more cost-effective solution at the time that they were installed, but the gravity outfall is a more flexible approach for the current and expected future population density. The gravity outfall is also less labor intensive to maintain compared to lift stations.

- Comment: Does the gravity sewer outfall have limitations related to hurricanes? Does it max out and require pump stations to mitigate heavy rainfall?

  Response: During the last two hurricanes, limited capacity of lift stations requiring pumping to minimize spillage. In a hurricane situation, a lift station is riskier than gravity outfall as far as potential for reaching capacity. Manholes have potential risk, but they will be designed with measures to minimize risk such as water-tight covers and elevation in areas of ponding. Infiltration and inflow in a gravity sewer system typically comes from the collection area itself, especially as the pipes begin to age. Impacts of the collection system feeding into a gravity outfall or lift station would be similar. The outfall design and remaining lift stations will be able to handle even critical flow capacity.

- Comment: Is the "Do Nothing" alternative not available because of a State requirement or concern about existing septic fields?

  Response: Doing nothing is not an acceptable option because PWC is obligated to provide sewer service as part of the annexation agreement. There have not been reports of failing septic systems at this time, but septic systems do have a limited timeframe.

- Comment: Does "Regional Lift Station" imply that the six individual lift stations would be consolidated into a larger one to transport wastewater:

  Response: No, "regional lift station" denotes a lift station that serves a larger geographic area.

- Comment: Is there an opinion on the likelihood of receiving additional state funding?

  Response: Without knowing what other projects will be submitted, there is really no way to know. The biggest disadvantage is that the state considers this an expansion project, which they prioritize lower than a rehabilitation project.

- Comment: Will the PWC Water Resources Department manage the project, or will construction be managed by an outside firm?

  Response: Typically, a large project like this is a combination. Our (PWC's) project coordinator will be involved.

Following the discussion with the Commissioners, the meeting was opened for public comment. One participant via videoconference asked the following questions:

- Comment: If PWC does not receive a third loan, will the cost be absorbed by the public?

  Response: The loan will have to be repaid, and the interest rate for the state loans is typically lower than the bonds. PWC also has additional options to have it funded by bonds or by deferring other projects.

- Comment: How will their neighborhood lift station look?

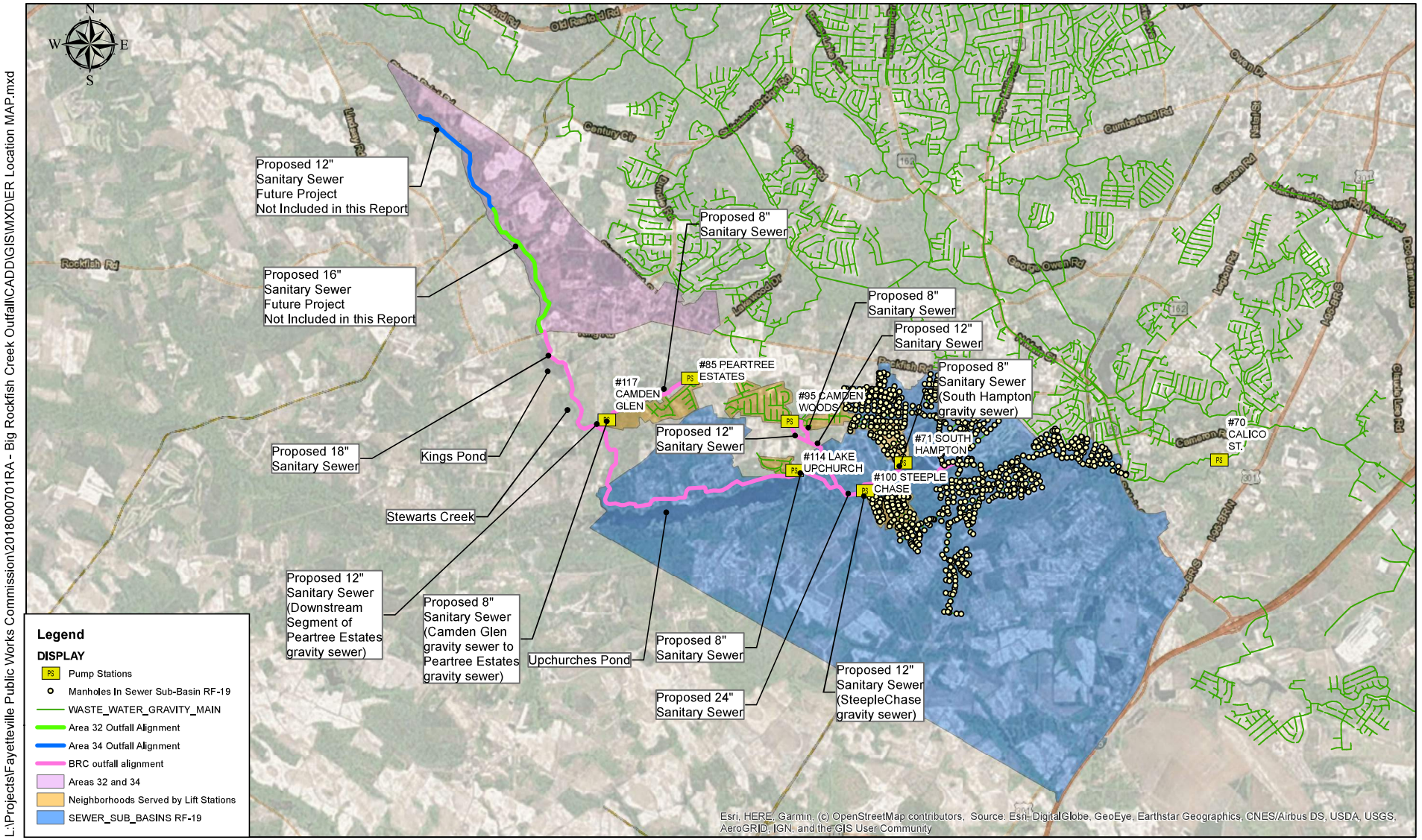
  Response: Everything will be removed except for the manhole, and the fence will remain around the manhole for security.

All questions were satisfactorily addressed during the meeting and no objections to the project were raised.

The current user charge for a typical residential customer is $70.19 per month for 5,000 gallons of water and sewer service combined. The proposed project will increase the bill by $1.62 (approximately 2.3%), for a future combined bill of $71.81. If an additional CWSRF loan is awarded in future funding rounds, the impact to user rates will be very similar with an increase of $1.65 for a future combined bill of $71.84.)

Sources consulted about this project for information or concurrence included

1) City of Fayetteville
2) Cumberland County
3) North Carolina Department of Environmental Quality
   -Wildlife Resources Commission
   -Natural Heritage Program
   -DEQ Fayetteville Regional Office
   -Division of Air Quality
   -Division of Water Resources
   -Division of Forest Resources
   -Division of Environmental Assistance and Customer Service
   -Division of Waste Management
4) North Carolina Department of Natural and Cultural Resources
5) North Carolina State Clearinghouse
6) North Carolina Department of Public Safety
7) U.S. Fish and Wildlife Service
8) U.S. Army Corps of Engineers



L:\Projects\Fayetteville Public Works Commission\2018000701RA - Big Rockfish Creek Outfall\CADD\GIS\MXD\ER Location MAP.mxd

Fayetteville, NC

WK DICKSON
community infrastructure consultants

FIGURE ES.2: PROJECT LOCATION MAP

0 5,000 10,000 Feet

1 inch = 5,000 feet

Appendix C
Easement Control Worksheet and Special Provisions

C.1
Control Sheet
(All Contracts)

	A	B	C	D	E	F	G	H	I	J	K	L	O	P	Q	S	T	V	W	X	Y	Z
1	PARCEL	STATUS	NEW PIN	O - Outfall L - Lift Sta B - Both	NAME	TW	ROW Assgnmt	AGENT	CONTRACT SECTION	SITUS STREET NO.	SITUS STREET NAME	DWG #	PWC ESMT#	RECORD DATE	DEED BK/PG	SP CON	STATUS	PB/PG	Perm Esmt	Temp Esmt	Driveway Permit Y/N-SIGNED	
2	1	SIGNED	0404-81-1142-	O	Lake Stone & Sons LLC	RP	ROWCONSUL		1	N/A	Golfview Dr	AS-15313A			10982/300		SIGNED	145/59	5,778	1,157	Y-SIGNED	
3	2	SIGNED	0404-71-8199-	O	Lake Stone & Sons Inc C/O Fairley Grimes	RP	ROWCONSUL		1	0	Permastone Lake Road	AS-15313B	19229	11/23/2020	10942/124		SIGNED	145/58	4,634	3,086		
4	3	SIGNED	0404-71-6235-	O	Lake Stone & Sons LLC		ROWCONSUL		1	N/A		AS-15313C	19228	11/23/2020	10942/095		SIGNED	145/63	3474	2298		
5	**4**	**SIGNED**	**0404-60-6535-**	**B**	**Turner, Marjorie Gillis**	**RP**	**ROWGROUP**		**1**	**N/A**		**AS-15313D**	**19378**	**3/17/2021**	**11061/375**		**SIGNED**	**145/46-47**	**51256**	**41440**		
6	5	ROE	0403-69-2966-	O	Lake Stone & Sons LLC	RP	ROWCONSUL		1	N/A		AS-15313E					ROE	145/62	16018	10534		
7	6	SIGNED	0404-50-7035-	O	Trogdon, Daisy J	RP	ROWGROUP		1	N/A		AS-15313F	19062	8/10/2020	10841/861		SIGNED	144/169	15143	10102		
8	7	SIGNED	0404-40-7174-	B	Davis, Patricia Jackson & William R	RP	ROWGROUP		1	N/A		AS-15313G	19016	3/18/2020	10719/869		SIGNED	144/32-33	53457	36948		
9	**8**	**SIGNED**	**0404-20-6862-**	**O**	**Riddle, Joseph P III**		**ROWGROUP**		**1**	**N/A**		**AS-15313H**	**19357**	**2/10/2021**	**11022/377**		**SIGNED**	**145/61**	**30588**	**20420**		
10	9	SIGNED	0404-02-5266-	B	St. James Square Inc. C/O Jason Johnson	RP	ROWCONSUL		4	0	Mission Hill Road	AS-15313I	19191 19191A	10/20/2020 3/23/2021	10908/100 11066/700		SIGNED	145/85-86	76793	41462		
11	9Z	SIGNED Access Esmt	0404-02-5266-	O	St. James Square Inc. C/O Jason Johnson	RP	ROWCONSUL		4	0	Mission Hill Road	AS-15313I					Access Esmt					
12	10	SIGNED	9494-90-3533	O	Little, Anthony Deryl & Wife Glenda Pridgen	RP	ROWGROUP		1	2345	Park Garden Ct	AS-15313J	19338	2/2/2021	11013/341		SIGNED	145/82	4283	3008		
13	11	Filed (Possession) on June 30th	9494-90-2530-	O	McLean, Gregory G (formerly Trace Homes)		ROWCONSUL		1	2348/ 2349	Park Garden Ct	AS-15313K	19427 & 19428	4/13/2021	11089/147 21 CVS 2403		POSSESSION	145/83	4014	2676		
14	14	SIGNED	9494-90-0552	O	Hall, Jerry & Wife Jacquelyn		~~ROWGROUP~~		1	2344	Park Garden Ct	AS-15313N	19433	4/19/2021	11094/665		SIGNED	144/195	8819	7433	Y-PENDING	
15	15	SIGNED	9494-80-8544-	O	Gagnon, Matthew & Jessica	RP	ROWCONSUL		1	2320	Mackenzie Lynn Ct	AS-15313O	19236	11/25/2020	10944/894		SIGNED	145/84	2626	N/A		
16	16	SIGNED	9494-80-7554-	~~O~~	Braddy, Christopher S & Wife	RP	ROWGROUP		1	2316	Mackenzie Lynn Ct	AS-15313P	19384	3/24/2021	11068/058		SIGNED	145/81	2401	N/A		
17	17	SIGNED	9494-80-6587-	O	Eklund, Ronald L & Wife Marissa R Rumsey	RP	ROWGROUP		1	2312	Mackenzie Lynn Ct	AS-15313Q	19238	11/25/2020	10945/002		SIGNED	145/80	2401	N/A		
18	18	SIGNED	9494-80-8851-	O	Preserve at Lake Upchurch Property Owners Assoc Inc	RP	ROWCONSUL		1	1333	Park Garden Ct	AS-15313R	19480	6/7/2021	11145/508		SIGNED	145/78-79	24397	14507		
19	19	SIGNED	9494-70-7243-	O	Bill Clark Homes of Fay LLC	RP	ROWCONSUL		1,4	0	Waldo Beach Rd	AS-15313S			10982/473		SIGNED	145/76-77	64256	43237		
20	20	SIGNED	9494-60-2453-	O	Noble, Charles F III & Wife Edie		ROWGROUP		2	2461	Lakeview Dr	AS-15313T	19026	6/8/2020	10785/204		SIGNED	144/93	2963	1849	Y-SIGNED	
21	21	SIGNED	9493-49-4898-	O	JT Dooley Properties 2 LLC	RP	ROWGROUP		2	0	Lakeview Dr	AS-15313U	19215	11/2/2020	10919/711		SIGNED	145/66	5823	3882	Y-SIGNED	
22	22	SIGNED	9493-39-9448-	O	Dean, Roy Lee Jr & Wife Chom Chu	RP	ROWGROUP		2	6745	Waldos Beach Rd	AS-15313V					SIGNED	145/67	31774	20845	Y-SIGNED	
23	23	SIGNED	9493-39-1578-	O	Dean, Roy Lee Jr & Wife Chom Chu	RP	ROWGROUP		2	6748	Waldos Beach Rd	AS-15313W					SIGNED	145/65	27003	18676	Y-SIGNED	
24	24	SIGNED	9493-29-6482-	O	Noblin, John M & Wife Theresa D		ROWGROUP		2	7070	Lamplighter Dr	AS-15313X	19443	4/26/2021	11102/631		SIGNED	145/70	3980	2653	Y-SIGNED	
25	25	SIGNED	9493-29-5490-	O	Noblin, John M & Wife Theresa D		ROWGROUP		2	0	Lamplighter Dr	AS-15313Y	19444	4/26/2021	11102/635		SIGNED	145/64	3617	2142	Y-SIGNED	
26	26	SIGNED	9493-29-4305-	O	Taylor, Donald R & Wife Nan O		ROWCONSUL		2	7068	Lamplighter Dr	AS-15313Z	19261	12/7/2020	10955/235		SIGNED	145/71	7828	5219	Y-SIGNED	
27	27	SIGNED	9493-29-1286-	O	Norman, William C & Wife Susan M		ROWGROUP		2	7069	Lamplighter Dr	AS-15313AA	19278	12/21/2020	10969/467		SIGNED	145/73	6612	4408	Y-SIGNED	
28	28	SIGNED	9493-19-9290-	O	Smith, Marcia M	RP	ROWGROUP		2	7075	Lamplighter Dr	AS-15313BB	19243	11/25/2020	10945/838		SIGNED	145/72	7442	4803	Y-SIGNED	
29	29	SIGNED	9493-19-7180-	O	Smith, Marcia M	RP	ROWGROUP		2	7077	Lamplighter Dr	AS-15313CC	19244	11/25/2020	10945/855		SIGNED	145/74	6076	3773	Y-SIGNED	
30	30	SIGNED	9493-19-5181-	O	Santoy, Michael J., Divorced	RP	ROWGROUP		2	3627	Mill Creek Rd	AS-15313DD	19014	3/18/2020	10719/866		SIGNED	144/31	2057	1722	Y-SIGNED	
31	31	SIGNED	9493-18-7819-	O	Dowless, Currie K & Wife Sonia P		ROWGROUP		2	3631	Mill Creek Rd	AS-15313EE	19015	4/15/2020	10741/205		SIGNED	144/42	953	1099	Y-SIGNED	
32	32	Filed June 28th - We Have Possession	9493-18-6924	O	Mill Creek Farms Homeowners Association	SF	ROWGROUP		2	0	Lake Farm Rd	AS-15313FF		6/29/2021	11169/0261		CONDEMN	145/69	5164	3066	Y-SIGNED	Filed 6-28-2021
33	33	SIGNED	9493-08-7845-	O	Wilson, Jeffrey Scott & Wife Theresa Carol	SF	ROWGROUP		2	7341	Mariners Landing Dr	AS-15313GG	19568	9/20/2021	11254/351		SIGNED	145/75	6352	475	Y-SIGNED	

	A	B	C	D	E	F	G	H	I	J	K	L	O	P	Q	S	T	V	W	X	Y	Z
34	34	SIGNED	9493-08-6843-	O	Patterson, Donna M	SF	ROWGROUP		2	7345	Mariners Landing Dr	AS-15313HH	19239	11/25/2020	10945/005		SIGNED	145/68	3513	N/A	Y-SIGNED	
35	35	SIGNED	9483-99-3846-	O	Torres, Gilbert & Wife Michelle	SF	ROWGROUP		2	7105	Mariners Landing Dr	AS-15313II	19409	3/23/2021	11066/722		SIGNED	145/55	4360	1385	Y-SIGNED	
36	36	SIGNED	9483-99-5916-	O	Giovannetti, Edwin Jr	SF	ROWGROUP		2	7115	Mariners Landing Dr	AS-15313JJ	19134				SIGNED	145/56	1357	1900	Y-SIGNED	
37	37A	SIGNED	9484-92-7453	O	Camden Glen Development LLC	SF	ROWCONSUL		3	N/A		AS-15313KK	19362	2/10/2021	11022/396			145/50-51	32032	45293	Y-SIGNED	
38	37B	Filed - We have POSSESSION	9484-90-3689-	O	Beasley, Johnny & Billy E Dees	SF	ROWCONSUL		3	N/A		AS-15313M	19429 & 19430	4/13/2021	11089/135 21 CVS 2401		POSSESSION	145/48-49	26475	18187	Y-SIGNED	
39	38	PENDING	9484-85-0564-	O	King, Vera B Heirs	SF	ROWCONSUL		3	N/A		AS-15313LL					PENDING	145/7-9	83368	55998	Y-SIGNED	
40	39	SIGNED	9484-66-6308-	O	King, W R Jr & Wife		ROWCONSUL		3	N/A		AS-15313MM	19047	6/29/2020	10805/414		SIGNED	144/119-121	53848		Y-SIGNED	
41	40	SIGNED	9484-66-8624-	O	King, W R Jr & Wife	SF	ROWCONSUL		3	3508	3508 Savannah Dr	AS-15313NN	19048	6/29/2020	10805/484		SIGNED	144/129	3060	2582	Y-SIGNED	
42	41	SIGNED	9484-66-6694-	O	King, W R Jr & Wife	SF	ROWCONSUL		3	3504	3504 Savannah Dr	AS-15313OO	19049	6/29/2020	10805/501		SIGNED	144/128	4217	2804	Y-SIGNED	
43	42	SIGNED	9484-66-5686-	O	King, W R Jr & Wife		ROWCONSUL		3	3454	3454 Savannah Dr	AS-15313PP	19050	6/29/2020	10805/504		SIGNED	144/130	4332	2772	Y-SIGNED	
44	43	SIGNED	9484-66-5706-	O	King, W R Jr & Wife		ROWCONSUL		3	3450	3450 Savannah Dr	AS-15313QQ	19051	6/29/2020	10805/618		SIGNED	144/124	1847	2468	Y-SIGNED	
45	44	SIGNED	9484-66-4824-	O	King, W R Jr & Wife		ROWCONSUL		3	3346	3346 Savannah Dr	AS-15313RR	19031	6/8/2020	10785/259		SIGNED	144/96	N/A	2440	Y-SIGNED	
46	45	SIGNED	9484-66-3922-	O	King, W R Jr & Wife		ROWCONSUL		3	3342	3342 Savannah Dr	AS-15313SS	19032	6/8/2020	10785/256		SIGNED	144/95	2138	3884	Y-SIGNED	
47	46	SIGNED	9484-67-2055-	O	King, W R Jr & Wife	SF	ROWCONSUL		3	3438	3438 Savannah Dr	AS-15313TT	19052	6/29/2020	10805/621		SIGNED	144/125	5461	3727	Y-SIGNED	
48	47	SIGNED	9484-67-3274-	O	Snyder, Patrick D & Wife Patricia M	SF	ROWGROUP		3	3434	3434 Savannah Dr	AS-15313UU	19020	5/18/2020	10766/734		SIGNED	144/71	1307	2640	Y-SIGNED	
49	48	PENDING	9484-67-3318-	O	Pierceall, Fred A	SF	ROWGROUP		3	3424	3424 Savannah Dr	AS-15313VV					PENDING	145/5	2114	2992	Y-SIGNED	
50	49	SIGNED	9484-67-2532-	O	Rodriguez, Kelly	SF	ROWGROUP		3	3420	3420 Savannah Dr	AS-15313WW	19037	6/29/2020	10805/659		SIGNED	144/123	5205	3568	Y-SIGNED	
51	50	SIGNED	9484-67-1676-	O	Rodriguez, Kelly	SF	ROWGROUP		3	0	0 Savannah Dr	AS-15313XX	19038	6/29/2020	10805/662		SIGNED	144/127	4586	3058	Y-SIGNED	
52	51	SIGNED	9484-67-1820-	O	Bell, Samuel L	SF	ROWGROUP		3	0	0 Savannah Dr	AS-15313YY	19022	6/8/2020	10785/201		SIGNED	144/92	4611	3026	Y-SIGNED	
53	52	PENDING	9484-67-1903-	O	King, Vera B Heirs	SF	ROWCONSUL		3	0	0 Savannah Dr	AS-15313ZZ					PENDING	145/04	3178	2186	Y-SIGNED	
54	53	PENDING	9484-68-1006-	O	King, Vera B Heirs		ROWCONSUL		3	0	0 Savannah Dr	AS-15313AAA					PENDING	145/06	2654	2512	Y-SIGNED	
55	54	SIGNED	9484-58-9154-	O	NC Dept of Transportation	SF	ROWGROUP		3	8317	King Rd	AS-15313BBB	19030	6/29/2020	10805/408		SIGNED	144/122	4917	3984	Y-SIGNED	
56	55	SIGNED	9484-58-9412-	O	King, W R Jr & Mary N	SF	ROWCONSUL		3	8736	King Rd	AS-15313CCC	19033	6/29/2020	10805/624		SIGNED	144/126	577	885	Y-SIGNED	
57	56	SIGNED	0404-50-5913-	L	Turner, Marjorie Gillis	SF	ROWCONSUL		1	N/A		AS-15313DDD	19380	3/17/2021	11061/352		SIGNED	144/200	11971	3070	Y-SIGNED	
58	57	SIGNED	0404-31-8623-	B	Milo Investments LLC	RP	ROWCONSUL		1	N/A		AS-15313EEE	19389	3/3/2021	11044/337		SIGNED	145/12-13	5385	4205	Y-SIGNED	
59	~~57A~~	~~ELIMINATED~~	~~0404-41-9355-~~	~~ELINATED~~	~~Milo Investments LLC~~		~~ELIMINATED~~		~~1~~	~~N/A~~		~~AS-15313FFF~~					~~ELIMINATED~~				Y-SIGNED	
60	58	SIGNED	0404-31-3069	O	GHM Group LLC				1			AS-15313FFF	19390	3/3/2021	11044/342		SIGNED	145/87-88	20592	16512	Y-SIGNED	
61	~~59~~	~~ELIMINATED~~	~~9494-90-4801-~~		~~Preserve at Lake Upchurch Property Owners Assoc. Inc~~	~~SF~~	~~ELIMINATED~~				~~2335 Park Garden Ct~~	~~AS-15313GGG~~					~~ELIMINATED~~				Y-SIGNED	
62	60& 60C	SIGNED	9494-62-3545-	L	Johnson, Barbara M Heirs	SF	ROWGROUP		4E	6125	Waldos Beach Rd	AS-15313HHH					SIGNED		28638	15137	Y-SIGNED	
63	61	SIGNED	9494-93-0181-	L	Ratley, Anthony C, Denise L R Holzer, Cheryl M Edge Et Al		ROWGROUP		4E	2378	Balaam Rd	AS-15313III	19023	6/8/2020	10785/241-255		SIGNED	144/94	11798	5933	Y-SIGNED	
64	62	CONDEMNED - WE HAVE POSSESSION	9494-93-3358-	L	Estates of Camden Homeowners Assoc Inc	SF	ROWGROUP		4E	4136	Newgate St	AS-15313JJJ	19551 19606	7/29/2021 11/22/2021	11200/276 11318/491		CONDEMN	144/196	9282	5069	Y-NO	
65	63	SIGNED	9494-93-8006-	L	JSJ Development Co LLC	RP	ROWCONSUL		4E	0	Andalusian Dr	AS-15313KKK	19190	11/16/2020	10933/700		SIGNED	144/192	5010	2646	Y-SIGNED	
66	64	SIGNED	9494-93-8365-	L	St James Square Inc C/O Jason Johnson	RP	ROWCONSUL		4E	N/A		AS-15313LLL	19189	10/20/2020	10908/110		SIGNED	144/193	3443	1738	Y-SIGNED	
67	65	SIGNED	9484-93-2843-	L	Hornaday Const. Co. Inc		ROWCONSUL		4W	N/A		AS-15313MMM	19060	8/10/2020	10841/855		SIGNED	145/01 (144/170)	5879 (5879)	2309 (2309)	Y-SIGNED	

	A	B	C	D	E	F	G	H	I	J	K	L	O	P	Q	S	T	V	W	X	Y	Z
68	66	SIGNED	9484-94-9032-	L	Dickens, Marvin & w. Elizabeth Dickens, Thomas Dixon & w., Kimberly	SF	ROWCONSUL		4W	N/A		AS-15313NNN	19208 19230	11/2/2020 11/23/2020	10919/742 10942/049		SIGNED	145/03	14348	4783	Y-SIGNED	
69	67	SIGNED	9494-04-3428-	L	Hudson, Ronald D & Wife Patricia P	SF	ROWCONSUL		4W	4096	Ardenwoods Dr	AS-15313OOO	19391	3/29/2021	11072/315		SIGNED	145/02	7138	2379	Y-SIGNED	
70	68	Filed	9494-46-1383-	L	Alhobishi, Fadhl		ROWCONSUL		4W	6501	Barbour Lake Rd	AS-15313PPP	19552	8/3/2021	Unrecorded		CONDEMN	145/10-11	66666	22105	Y-SIGNED	
71	69	Verbal Settlement	9494-35-0271-	L	Martin, William H & Wife Phyllis L	SF	ROWCONSUL		4W	6411	Barbour Lake Rd	AS-15313QQQ					CONDEMN	144/199	45748	23090	Y-SIGNED	
72	70	Verbal Settlement	9494-35-8712-	L	Martin, William H & Wife Phylllis L. Martin	SF	ROWCONSUL		4W	N/A		AS-15313RRR					CONDEMN	144/198	4572	2833	Y-SIGNED	
73	71	SIGNED	0404-30-4001-	B	Torres, Daniel Sr & Wife	SF	ROWGROUP		1	4479	Jockey Whip Ln	AS-15313SSS	19071	8/26/2020	10857/649		SIGNED	144/194	8165	11925	Y-SIGNED	
74	72	SIGNED	0403-39-2797-	L	Miller, Christopher & Wife Angela	SF	ROWGROUP		1	4471	Jockey Whip Ln	AS-15313TTT	19054	8/10/2020	10841/858		SIGNED	144/171	940	2147	Y-SIGNED	
75	DOT1 (73)	SIGNED	9484-93-3623-	B	Peartree West Owners Association	SF	PWC		4W	0	Ritson Ln	AS-15313GGG	19557	8/23/2021	11225/438		SIGNED	144/197	14699	6715		
76	DOT2 (74)	SIGNED	0404-10-3295-	B	Walter & Maude Estate LLC		ROWGROUP		1,4	N/A		AS-15313UUU	19271	12/9/2020	10958/181		SIGNED	145/57	121763	73544	Y-SIGNED	
77	DOT3 (75)	CONDEMNED - WE HAVE POSSESSION	9484-83-4294-	B	Johnny Beasley & Billy E. Dees	SF	ROWCONSUL		3	N/A		AS-15313L	19431 & 19432	4/13/2021	11089/142 21 CVS 2402		POSSESSION	145/52-54	98261	64869	Y-SIGNED	
78	76	Averette Signed; CONDEMN Hickman 1/2 Interest - Possession Aug 2nd	9484-73-6270	O	William V. Hickman & Charles David Averette	GH	ROWCONSUL		3	N/A	N/A	AS-15313VVV	19418 19553	4/7/2021 7/27/2021	11082/798 Unrecorded		CONDEMN 1/2 Int Signed	145/60	113	288	Y-SIGNED	
79	156	SIGNED	9494-91-1408	O	Gregory McGill, Unmarried	GH			1,2	0	Park Garden Court	AS-15313XXX	19325	1/19/2021	10996/298		SIGNED	145/200			Y-SIGNED	
80	157	SIGNED	9494-91-3122	O	The Preserve at Lake Upchurch					0	Park Garden Court	AS-15313YYY	19479	6/4/2021	11144/262		SIGNED				Y-SIGNED	
81	158	SIGNED	9494-81-4713	O	Johnson, Barbara M Heirs						ACCESS ESMT Park Garden Court	AS-15313ZZZ	19464	5/18/2021	11125/556		SIGNED				Y-SIGNED	
82	159	SIGNED	9494-91-1309	O	Matt Hindrichs						ACCESS ESMT 4204 Saleeby Way	AS-15313AAAA	19350	2/10/2021	11022/247		SIGNED				Y-SIGNED	
83		SIGNED	ENCROACHMENT		NCDOT							AWS-15313XXX	18842	1/25/2021			SIGNED				Y-SIGNED	
84		SIGNED	ENCROACHMENT		NCDOT							AS-15313BBB	18846	1/25/2021			SIGNED				Y-SIGNED	
85		SIGNED	ENCROACHMENT		NCDOT							AS-15313AAA	18845	1/25/2021			SIGNED				Y-SIGNED	
86																						
87																						
88	NOTE:	Esmts Needed for Future Camden Preserves	Parcels 4,7,9,56,57a, 61,62,63,64,74																			

C.2
Condemnation Parcels
(All Contracts)

	A	B	C	D	F	L	M	N	R	S	AA	AC	AF	AG
1	PARCEL	NEW PIN	O - Outfall L - Lift Sta B - Both	NAME	ROW FIRM	CONTRACT SECTION	SITUS STREET NO.	SITUS STREET NAME	OFFER SENT	$AMT Offered	STATUS	PB/PG	PWC Commission Approved	COF ADMIN NOTICE
5	4	0404-60-6535-	B	Turner, Marjorie Gillis	RWG	1	N/A				CONDEMN	145/46-47	Jan 13th	Feb 8th
6	5	0403-69-2966-	O	Lake Stone & Sons LLC	ROC	1	N/A				ROE	145/62		
9	8	0404-20-6862-	O	Riddle, Joseph P III	RWG	1	N/A				CONDEMN	145/61	Jan 13th	Feb 8th
11	9-Z	0404-02-5266-	O	St. James Square Inc. C/O Jason Johnson	RWC	4	0	Access Esmt			PENDING	NEW		
12	10	9494-90-3533	O	Little, Anthony Deryl & Wife Glenda Pridgen	RWG	1	2345	Park Garden Ct			SIGNED	145/82		
13	11	9494-90-2530-	O	McLean, Gregory G (formerly Trace Homes	RWC	1	2348 /234 9	Park Garden Ct			CONDEMN	145/83	Jan 13th	Feb 8th
14	14	9494-90-0552	O	Hall, Jerry & Wife Jacquelyn	RWG	1	2344	Park Garden Ct			CONDEMN	144/195	Jan 13th	Feb 8th
16	16	9494-80-7554-	~~O~~	Braddy, Christopher S & Wife	RWG	1	2316	Mackenzie Lynn Ct			PENDING	145/81		
18	18	9494-80-8851-	O	Preserve at Lake Upchurch Property Owners Assoc Inc	RWC	1	2333	Park Garden Ct			CONDEMN	145/78-79	Jan 13th	Feb 8th
22	22	9493-39-9448-	O	Dean, Roy Lee Jr & Wife Chom Chu	RWG	2	6745	Waldos Beach Rd			CONDEMN	145/67	Jan 13th	Feb 8th
23	23	9493-39-1578-	O	Dean, Roy Lee Jr & Wife Chom Chu	RWG	2	6748	Waldos Beach Rd			CONDEMN	145/65	Jan 13th	Feb 8th
24	24	9493-29-6482-	O	Noblin, John M & Wife Theresa D	RWG	2	7070	Lamplighter Dr			CONDEMN	145/70	Jan 13th	Feb 8th
25	25	9493-29-5490-	O	Noblin, John M & Wife Theresa D	RWG	2	0	Lamplighter Dr			CONDEMN	145/64	Jan 13th	Feb 8th
32	32	9493-18-6924	O	Mill Creek Farms Homeowners Association	RWG	2	0	Lake Farm Rd			CONDEMN	145/69	Jan 13th	Feb 8th
35	35	9483-99-3846-	O	Torres, Gilbert & Wife Michelle	RWG	2	7105	Mariners Landing Dr			CONDEMN	145/55	Jan 13th	Feb 8th
37	37A	9484-92-7453	O	Camden Glen Development LLC	RWC	3	N/A				PENDING?	145/50-51	ADD TO LIST	ADD TO LIST
38	37B	9484-90-3689-	O	Beasley, Johnny & Billy E Dees	RWC	3	N/A				CONDEMN	145/48-49	ADD TO LIST	ADD TO LIST
39	38	9484-85-0564-	O	King, Vera B Heirs	RWC	3	N/A				PENDING?	145/7-9	ADD TO LIST	ADD TO LIST
49	48	9484-67-3318-	O	Pierceall, Fred A	RWG	3	3424	Savannah Dr			PENDING	145/5		
53	52	9484-67-1903-	O	King, Vera B Heirs	RWC	3	0	0 Savannah Dr			PENDING	145/04	ADD TO LIST	ADD TO LIST
54	53	9484-68-1006-	O	King, Vera B Heirs	RWC	3	0	0 Savannah Dr			PENDING	145/06	ADD TO LIST	ADD TO LIST
57	56	0404-50-5913-	L	Turner, Marjorie Gillis	RWC	1	N/A				CONDEMN	144/200	Jan 13th	Feb 8th
58	57	0404-31-8623-	B	Milo Investments LLC	RWC	1	N/A				CONDEMN	145/12-13	Jan 13th	Feb 8th
59	~~57A~~	~~0404-41-9355-~~		~~Milo Investments LLC~~	~~RWG~~	~~1~~	~~N/A~~				~~ELIMINATED~~		~~Jan 13th~~	~~Feb 8th~~
60	58	0404-31-3069	O	GHM Group LLC	RWG	1					CONDEMN	145/87-88	Jan 13th	Feb 8th

	A	B	C	D	F	L	M	N	R	S	AA	AC	AF	AG
61	~~59~~	~~9494-90-4801-~~		~~Preserve at Lake Upchurch Property Owners Assoc. Inc~~	~~RWC~~			~~2335 Park Garden Ct~~			~~ELIMINATED~~		~~Jan 13th~~	~~Feb 8th~~
62	60	9494-62-3545-	L	Johnson, Barbara M Heirs	RWG	4E	6125	Waldos Beach Rd			SIGNED			
64	62	9494-93-3358-	L	Estates of Camden Homeowners Assoc Inc	RWG	4E	4136	Newgate St			CONDEMN	144/196	ADD TO LIST	ADD TO LIST
69	67	9494-04-3428-	L	Hudson, Ronald D & Wife Patricia P	RWC	4W	4096	Ardenwoods Dr			CONDEMN	145/02	ADD TO LIST	ADD TO LIST
70	68	9494-46-1383-	L	Alhobishi, Fadhl	RWC	4W	6501	Barbour Lake Rd			CONDEMN	145/10-11	ADD TO LIST	ADD TO LIST
71	69	9494-35-0271-	L	Martin, William H & Wife Phyllis L	RWC	4W	6411	Barbour Lake Rd			CONDEMN	144/199	ADD TO LIST	ADD TO LIST
72	70	9494-35-8712-	L	Martin, William H & Wife Phylllis L. Martin	RWC	4W	N/A				CONDEMN	144/198	ADD TO LIST	ADD TO LIST
75	DOT1 (73)	9484-93-3623-	B	Peartree West Owners Association	RWG	4W	0	Ritson Ln			CONDEMN	144/197	ADD TO LIST	ADD TO LIST
77	DOT3 (75)	9484-83-4294-	B	Johnny Beasley & Billy E. Dees	RWC	3	N/A				CONDEMN	145/52-54	ADD TO LIST	ADD TO LIST
78	76	9484-73-6270	O	William V. Hickman & Charles David Averette	RWC	3	N/A	N/A			ROE-Averette Condemn Hickman	145/60	ADD TO LIST	ADD TO LIST
79	156	9494-91-1408	O	Gregory McGill, Unmarried		1,2	0	ACCESS ESMT Park Garden Court		$2,430.00	SIGNED	145/200		
80	157	9494-91-3122	O	The Preserve at Lake Upchurch		1,2		ACCESS ESMT Park Garden Court			Pending			
81	158	9494-62-3545	O	Johnson, Barbara M Heirs				ACCESS ESMT Park Garden Court			Pending			
82	159		O	Matt Hindrichs				ACCESS ESMT 4204 Saleeby Way			SIGNED			

C.3
Special Conditions
(All Contracts)

PARCEL	PIN	NAME	SITUS ADDRESS	SPECIAL CONDITIONS
10	**9494-90-3533**	**Anthony (Deryl) Little**	**2345 Park Garden Ct**	**Owner request any suitable excess soil excavated on property be laid aside at an appropriate designated area.**
04 & 56	0404-60-6535	Majorie Turner Gillis	Permastone Lake Rd	Replace former fence with a gate to mainatin security of Fantasy Lake Water Park from people who may use the cleared easement for access.
15	9494-80-8544-	Gagnon	2320 Mackenzie Ct.	PWC will have site evaluated before construction; Owner's retaining wall is permitted to encroach into easement area; any environmental damage as a result of sewer is PWC responsibility to clean; if root system of tree is damaged PWC will be responsible to clean up or remove: PWC and owner's will not block or gate the easement area
16	9494-80-7554	Christopher Braddy	2316 MacKinzie Ct	No disturbance above during construction (installation via bore). Access limited to easement.
17	9494-80-6587	Ronald Eklund	2312 MacKinzie Ct	notify owner prior to entry on property
18 & 57	9494-80-8851	Preserves at Lake Upchhurch		Coordinate with HOA (Landon Weaver) Prior to construction. Exsiitng asphalt parking lot to be repaved not patched. Coordinate with LREM on gating access road to prevent unauthorized entry via Temporary Access Rd
26	9493-29-4305-	Taylor, Donald R & Wife Nan	7068 Lamplighter Drive	repair electric line running along western property line; repair water line running along eastern property line, repair French drain running along eastern property line and into the easement area. Notify owner prior to entry onto property.
29	9493-19-7180-	Smith, Marcia M	7077 Lamplighter Dr.	Move old farm implement (Antique Hay Rake) out of the way and placer back after work completed.
34	9493-08-6843-	Donna M Patterson	7345 Mariners Landing Dr.	Per note on construct tion plans, no equipment on this property.
36	9483-99-5916-	Giovannetti, Edwin Jr	7115 Mariners Landing Dr.	Temporary fencing required through back yard along TCE line to contain both dogs and small children. 5-6 tall fencing is preferred. Fencing needs to extend from rear lot line to rear of house due to removal of a portion of existing privacy fencing.
47	9484-67-3274-	Snyder, Patrick D & Wife Patricia M	3434 Savannah Dr	Needs Temporary Fencing along easement limits where existing fencing will be removed in order to contain dogs.
63	9494-93-8006-	JSJ Development Co LLC	0 Andalusian Drive	Repair drain pipe into retention pond if disturbed
35	9483-99-3846-	Torres, Gilbert & Wife Michelle	7105 Mariners Landing	do not disturb the existing fence. Only Equipment to access property is to be only necessary for tree removal and grinding of stump's. Be careful with bore as it crosses under owners septic drain field - hence no heavy equipment on property

C.4

Easement Status Map

NC HWY 295 N
NC HWY 295 S
NC HWY 295 S OFF RAMP EXIT 7
NC HWY 295 S ON RAMP EXIT 7
RIVECREST DR
WALDOS BEACH RD
LAKEVIEW DR
PINEVIEW DR
HARVEST CT
FARM CIRCLE RD
CAMDEN RD
MARINERS LANDING DR
MILL CREEK RD
LAMPLIGHTER DR
LAKE UPCHURCH DR
BAYSHORE DR

SEE INSET 1

CONTRACT LEGEND

- Big Rockfish Creek Outfall
- Contract #1
- Contract #2
- Contract #3
- Contract #4

CONTRACT PARCEL LEGEND

- Easement Parcel (RoE Obtained)
- Easement Parcels (Pending)
- Impacted Parcel (No RoE Needed)
- Easement Parcel (Potential Condemnation)
- Well Relocations & Variances
- Tax Parcel

INSET 1

WK DICKSON
community infrastructure consultants

Big Rockfish Creek Outfall - Contract 2
Fayetteville Public Works Commission
Cumberland County, North Carolina

Date: 10/11/2022

0 350 700 1,400 Feet
1 inch = 700 feet

Appendix D
Existing Condition Structural Surveys

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *November 18, 2020*

Subject: *Big Rockfish Creek Outfall*
2320 Mackenzie Lynn Court
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 2320 Mackenzie Lynn Court, Hope Mills, NC 28348 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on November 10, 2020 to evaluate structures that were located near or within the permanent easement. The site evaluation was a limited structural visual inspection. Any visual damage or deterioration observed to the structures was noted.

The house is a two-story single-family residence with no outbuildings. The house was built very recently and is in good structural condition with no signs of structural deterioration or damage. Photos are provided in the attached report showing the existing condition of the house. During the site visit, CDM Smith observed a small crack in the concrete driveway near the road. A picture of this crack is provided in the attached report. The existing structures at this property are unlikely to be adversely affected by construction.

There is a proposed retaining wall at the south side of the property that is shown in the civil drawings provided by WK Dickson. CDM Smith observed stakes for the retaining wall on November 10, 2020, but construction has not started on the retaining wall. Once the construction of the retaining wall is completed, CDM Smith will need to perform a visual structural evaluation of the retaining wall prior to the construction of the sanitary sewer pipe.

If you have any comments or questions regarding the structural property evaluations, please contact us.

2320 Mackenzie Lynn Court
Hope Mills, NC 28348

Date Observed:
November 10, 2020

Photo 1

The north (front) side of the house is in good condition with no signs of damage or deterioration.

Photo 2

The north side of the house is in good condition with no signs of damage or deterioration.

CDM Smith

2320 Mackenzie Lynn Court
Hope Mills, NC 28348

Date Observed:
November 10, 2020

Photo 3

The east side of the house is in good condition. There are no visible issues.

Photo 4

The east side of the house is in good condition. There are no visible issues.

2320 Mackenzie Lynn Court
Hope Mills, NC 28348

Date Observed:
November 10, 2020

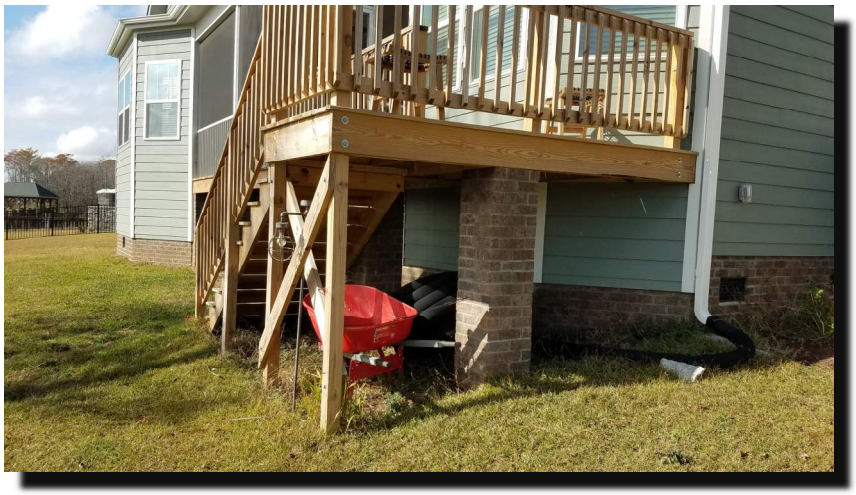


Photo 5

The deck at the southeast corner of the house is in good condition with no visible signs of damage or deterioration.

Photo 6

The south and west sides of the house are in good condition with no visible signs of damage or deterioration.

2320 Mackenzie Lynn Court
Hope Mills, NC 28348

Date Observed:
November 10, 2020

Photo 7

At the south side of the property, there are some surface water drains and pipes near the rip rap, which appears to be in good condition.

2320 Mackenzie Lynn Court
Hope Mills, NC 28348

Date Observed:
November 10, 2020

At the end of the concrete driveway, there is a small crack shown in the clouded region.

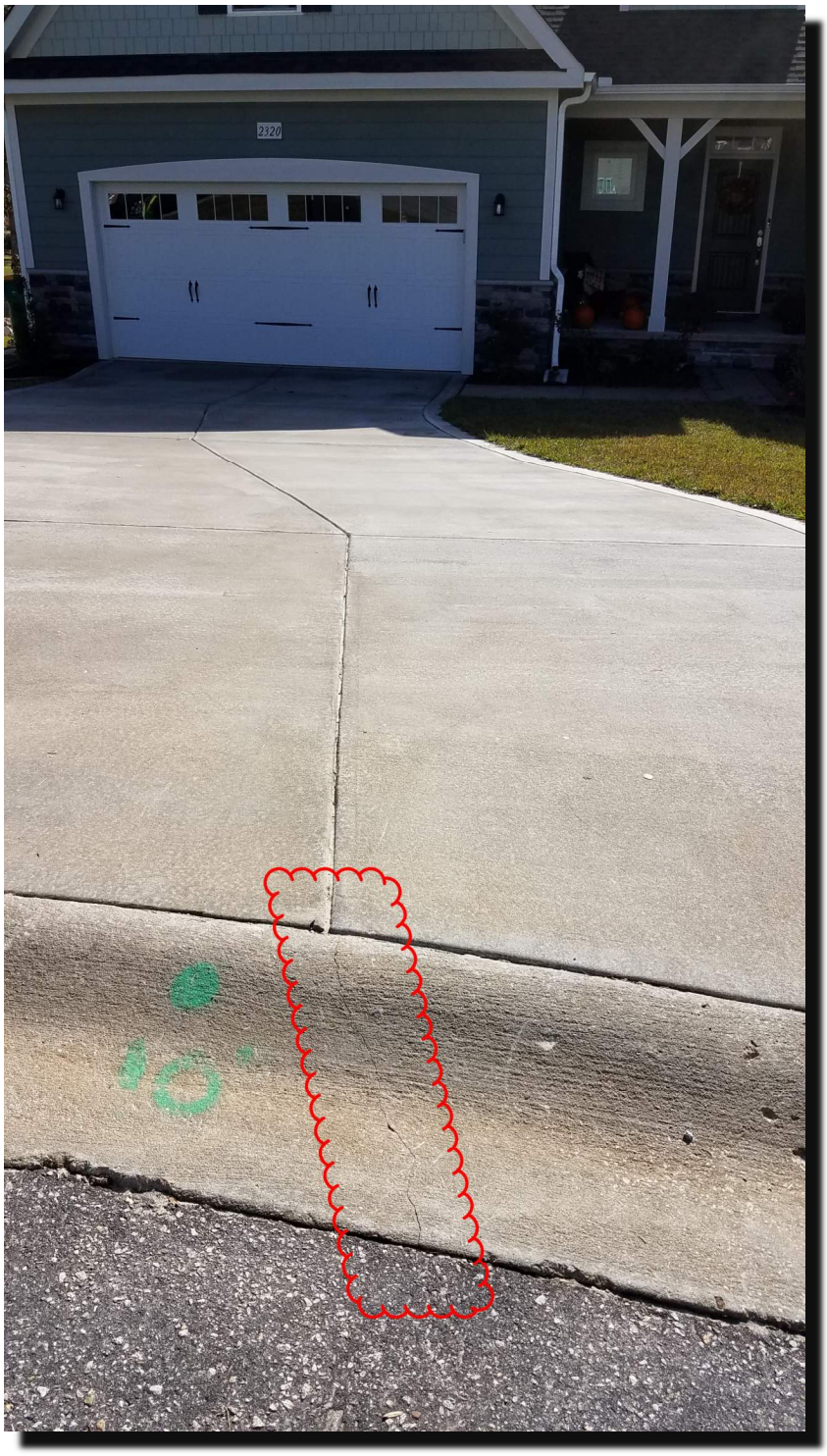


Photo 8

CDM Smith

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *August 1, 2021*

Subject: *Big Rockfish Creek Outfall*
2344 Park Garden Court
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 2344 Park Garden Court, Hope Mills, NC 28348 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on July 2, 2021 to evaluate structures that were located near or within the permanent easement. The site evaluation was a limited structural visual inspection. Any visual damage or deterioration observed to the structures was noted.

The house is a two-story single-family residence with a detached garage with a loft. There is also a concrete boat launch ramp and wood dock. The house and detached garage were built recently and are in good structural condition with a few signs of damage and deterioration. Photos are provided in the attached report showing the existing condition of the structures. The proposed pipe is approximately 60 feet from the house and 41 feet from the patio at the south side of the house. At this location, the pipe is approximately 18 feet deep, so the house and patio are unlikely to be adversely affected by construction. The detached garage is over 100 feet from the proposed pipe, so the detached garage is also unlikely to be adversely impacted by construction. The edge of the 16 foot deep receiving pit is approximately 18 feet from the wood dock and 8 feet from the landscape block retaining wall. If slope stability is maintained during construction, the wood dock is unlikely to be adversely affected by the proposed construction, because the dock and foundations are lightly loaded. The landscaping block retaining wall near the receiving pit resists approximately 18 inches of soil, and although it was unable to be confirmed during the site survey, the retaining wall likely does not have a foundation extending past the extents of the wall. If the receiving pit slope is stabilized during construction, the retaining wall is unlikely to be adversely affected by construction. If the soil around the receiving pit becomes unstable, the retaining wall and wood dock could be damaged.

If you have any comments or questions regarding the structural property evaluations, please contact us.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 1

There is an attached garage at the northeast corner of the house. The attached garage is in good condition with no signs of damage or deterioration.

Photo 2

The south side of the attached garage is in good condition. The concrete driveway leading to the house is also in good condition. A small crack in the concrete driveway was observed and is shown in Photo 3.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 3

There is a small crack in the clouded region, which is located near the front porch of the house.

Photo 4

There were three vehicles in the driveway during the inspection. Large portions of the driveway could not be closely inspected because the vehicles obscured the concrete.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 5

The east side of the house near the garage is in good condition. The front porch is also in good condition.

Photo 6

The east side of the house near the south side of the front porch is in good condition. There was a small crack in the stone façade observed in the clouded region (see Photo 7).

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 7

A thin crack was observed in the stone façade at the east side of the house.

Photo 8

The south side of the house is in good condition with no visible signs of damage or deterioration. There is a concrete patio at the south side of the house.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 9

The outdoor kitchen station is in good condition with no observed signs of damage or deterioration.

Photo 10

The patio at the south side of the house is in good condition. There was no observed damage or deterioration.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 11

The west side of the house is in good structural condition. The wood siding on the gable in front of the chimney is heavily stained.

Photo 12

The north side of the house is in good condition.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 13

The north side of the house is in good condition. There is some staining in the clouded region next to the HVAC unit (see Photo 14).

Photo 14

The brick façade at the foundation is stained and has mold growth in the clouded region.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 15

There is a detached garage on the north side of the property. The detached garage is in good condition with few signs of deterioration (see Photo 19). The east side of the garage is shown here.

Photo 16

The north side of the house is in good condition with no visible signs of damage or deterioration.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 17

The north side of the house is in good condition with no visible signs of damage or deterioration. There is a concrete patio at the west side of the detached garage.

Photo 18

The west side of the detached garage is in good condition. There is some deterioration in the clouded region (see Photo 19).

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 19

There is erosion at the northwest corner of the patio behind the detached garage.

Photo 20

The concrete patio at the back of the detached garage is in good condition with no observed cracking.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

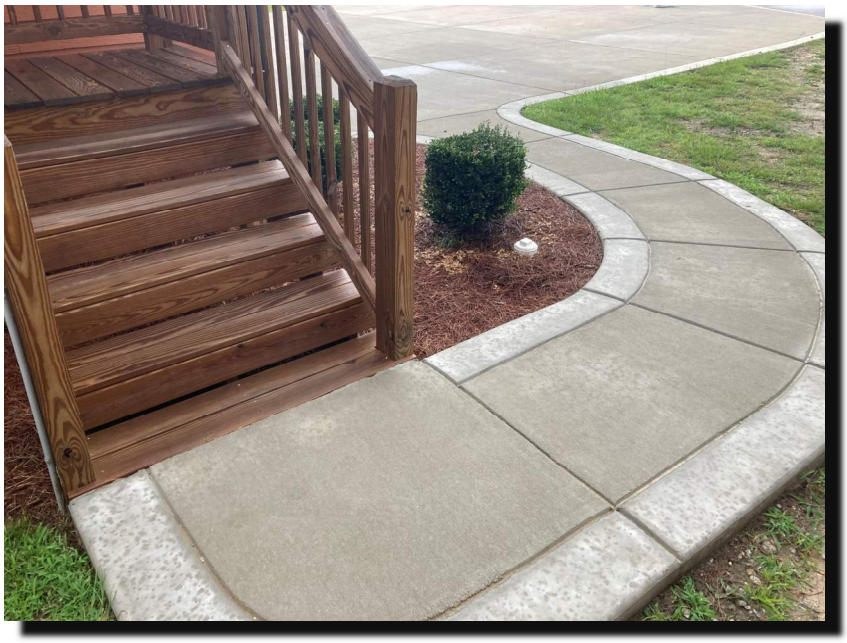


Photo 21

The concrete sidewalk leading to the stairs at the detached garage is in good condition.

Photo 22

The concrete driveway leading to the detached garage is in good condition. There was cracking observed at the east end of the driveway near the road (see Photo 23).

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 23

There is a thin crack at the east end of the driveway that leads to the detached garage.

Photo 24

There is a stone retaining wall that starts at the northwest corner of the detached garage and extends along the west side of the property. The retaining wall ends at the southeast corner of the property. Photos 24 through 32 show sections of the retaining wall. No bowing of the retaining wall was observed, and the retaining wall is in good condition.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 25

This section of the retaining wall is on the west side of the detached garage. The retaining wall is in good condition.

Photo 26

This section of the retaining wall is on the west side of the detached garage. The retaining wall is in good condition.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 27

The retaining wall behind the west side of the house is interrupted by a storm sewer pipe. The retaining wall is in good condition.

Photo 28

This section of the retaining wall is at the southwest corner of the property. The retaining wall is in good condition.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 29

This section of the retaining wall at the south side of the property runs underneath a wood dock, which is in good condition with no observed signs of damage or deterioration.

Photo 30

This section of the retaining wall at the south side of the property is interrupted by a tree. The retaining wall is in good condition.

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

Photo 31

This section of the retaining wall is at the south side of the property. The retaining wall is in good condition.

Photo 32

The retaining wall ends at the southeast corner of the property. There is a concrete boat launch ramp near the southeast corner of the property (see Photos 33 and 34).

2344 Park Garden Court
Hope Mills, NC 28348

Date Observed:
July 2, 2021

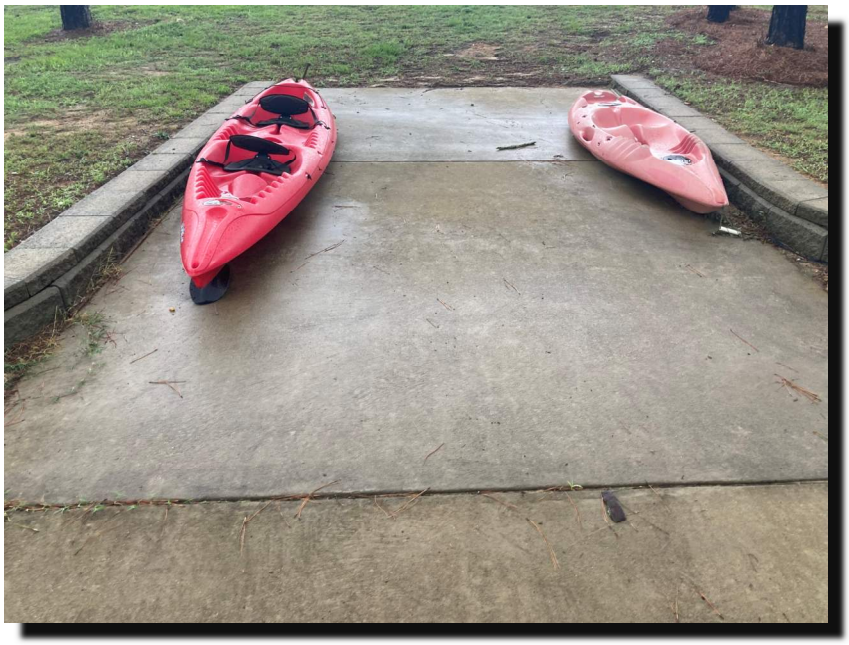


Photo 33

The boat launch ramp is in good condition. There is some cracking shown in Photo 34 at the southwest corner of the boat launch ramp. The drawings provided to CDM Smith indicate that the boat launch ramp will be replaced after the proposed pipe is installed.

Photo 34

There is a crack at the southwest corner of the boat launch ramp.

2344 Park Garden Court
Hope Mills, NC 28348

Photo 35

Date Observed:
July 2, 2021

At the south side of the property there are some chin up bars. The wood posts for the taller chin up bar are not plumb. These chin up bars are within the limits of disturbance and could be adversely affected during construction of the pipe.

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *April 16, 2021*

Subject: *Big Rockfish Creek Outfall*
3420 Savannah Drive
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 3420 Mariners Landing Drive, Fayetteville, NC 28306 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on March 12, 2021 to evaluate structures that were located near or within the easements. The site evaluation was a limited structural visual inspection. Any visual damage or deterioration to permanent structures was noted.

The proposed pipe is located on the west side of the property between the house and shed located next to the pond. The proposed pipe is approximately 11.5 feet deep. The proposed pipe is located approximately 45 feet away from the west side of the house and approximately 17 feet from the east side of the shed. Due to the depth of the pipe and large distance from the pipe to the house, the house should not be adversely affected by the proposed construction. The proposed pipe is close to the shed, which could be adversely affected by the proposed construction. The 90% design drawings by McKim & Creed indicate that the trench shall be supported near the shed. Appropriately designed protection measures should be adequate to avoid adversely affecting the shed. Additionally, there is a chain-link fence dog pen that is located in the temporary construction easement. If access is required for construction equipment within the full width of the construction easement, the dog pen would likely need to be relocated.

If you have any comments or questions regarding the structural property evaluations, please contact us.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 1

The front (east side) of the house is in good condition with no observed signs of damage or deterioration.

Photo 2

The south side of the house is also in good condition with no apparent signs of damage or deterioration.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 3

The southwest corner of the house is in good condition with no observed signs of damage or deterioration.

Photo 4

The back (west) side of the house is in good condition with no observed signs of damage or deterioration.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 5

The south side of the house at the back patio is in good condition with some minor staining to the siding and gutters.

Photo 6

The patio at the back (west side) of the house consists of a concrete slab-on-grade. The slab has several cracks, which are highlighted in by the two clouded regions.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

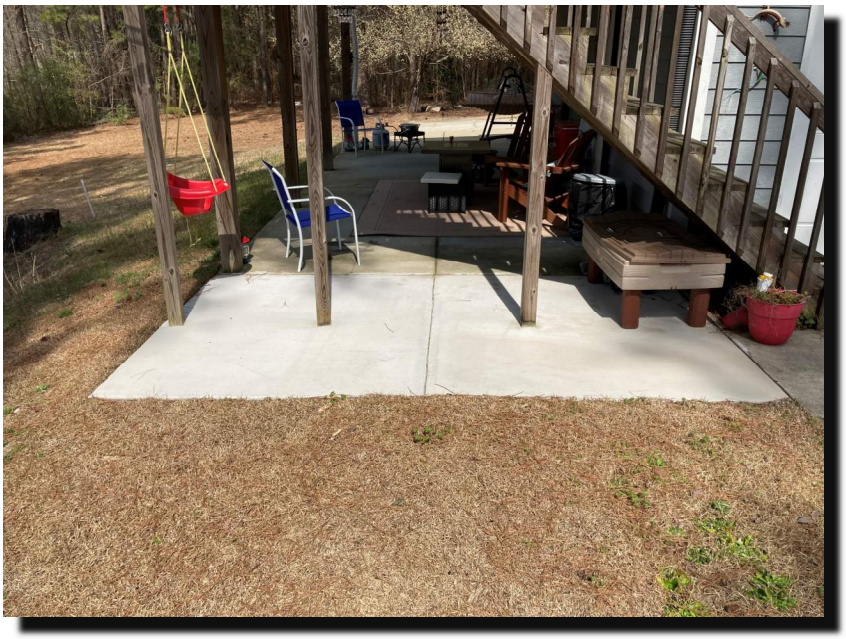


Photo 7

The back patio extends to the northwest corner of the house. At the northwest corner of the house, there is an elevated wood deck that appears to be in good condition.

Photo 8

At the northwest corner of the house, just west of the attached garage, the concrete appears to be in good condition. There are no signs of cracking on the concrete slab under the elevated deck, but there is some minor staining of the concrete. CDM Smith was unable to evaluate the condition of the concrete located under the pink rug.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 9

This portion of the concrete driveway is located north of the attached garage. There are large cracks in the clouded regions and some significant staining near the garage doors. Some vegetation is growing through the cracks and joints.

Photo 10

The attached garage is located at the northwest corner of the house. The garage doors and the siding near the downspout are heavily stained. The concrete in front of the garage doors and leading from the downspout is also heavily stained.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 11

The north side of the house is in good condition. Damage and deterioration to the siding and garage doors is shown in Photo 10.

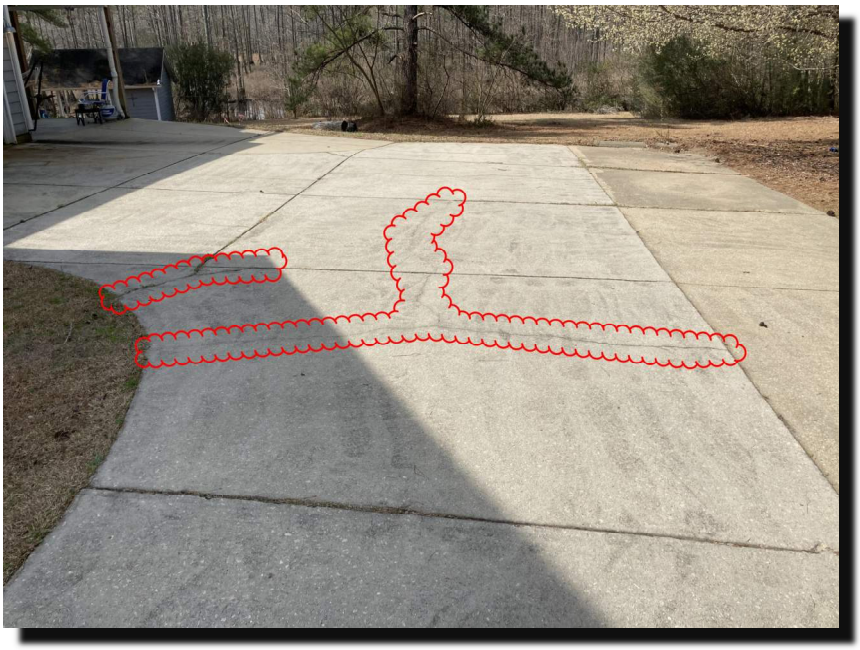


Photo 12

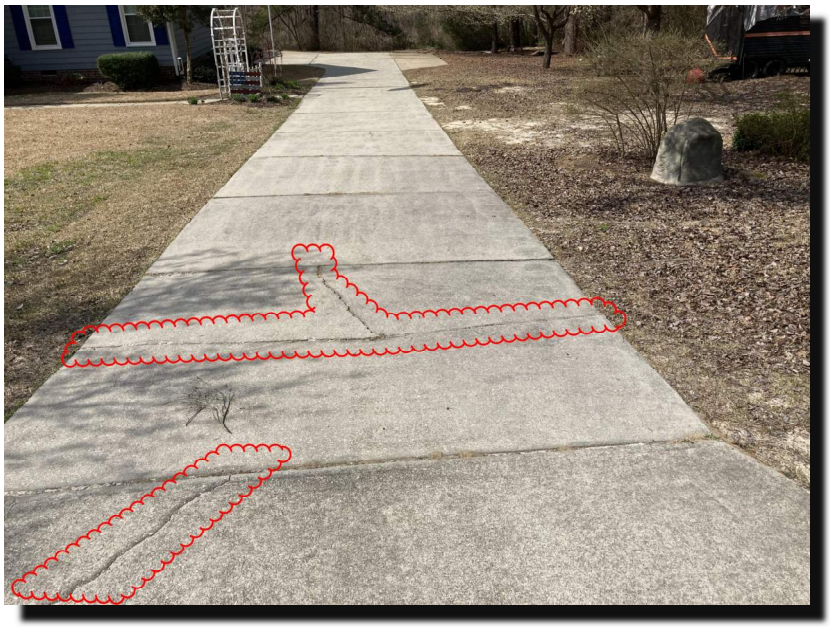
The west end of the concrete driveway is in fair condition with some cracking highlighted in the clouded regions. Photo 9 shows additional cracking that is in the background of this picture.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

There is an additional crack concrete driveway in the clouded region. The front sidewalk can be seen the background of the picture.

Photo 13



At the east end of the driveway there are additional cracks shown in the clouded regions.

Photo 14

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 15

There is a chain-link fence dog pen near the southwest corner of the house. The chain-link fencing appears to be in good condition with no signs of damage or deterioration.

Photo 16

Per the survey stakes on the property, it appears that the chain-link fence dog pen appears to be within the temporary construction easement.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 17

There is a wood shed at the west side of the property near the pond. The north side of the shed is in good condition.

Photo 18

The east side of the shed is in good condition. There is some minor staining of the siding. The roof is in poor condition. About 50 percent of the roof is covered in moss and there is some vegetation growing out of the gutter.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 19

There is a crack shown in the clouded region spanning north to south on the concrete slab located south of the shed doors. CDM Smith was unable to evaluate the condition of the slab under the boat and other items stored on the slab. The shed door is missing a doorknob.

Photo 20

The south side of the shed is in good condition. Some deterioration is noted in Photo 21.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 21

There is some minor staining of the siding on the south side of the shed. The wood post in the clouded region is rotated around its vertical axis.

Photo 22

The southwest corner of the concrete slab next to the shed has poor consolidation in the clouded region.

3420 Savannah Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

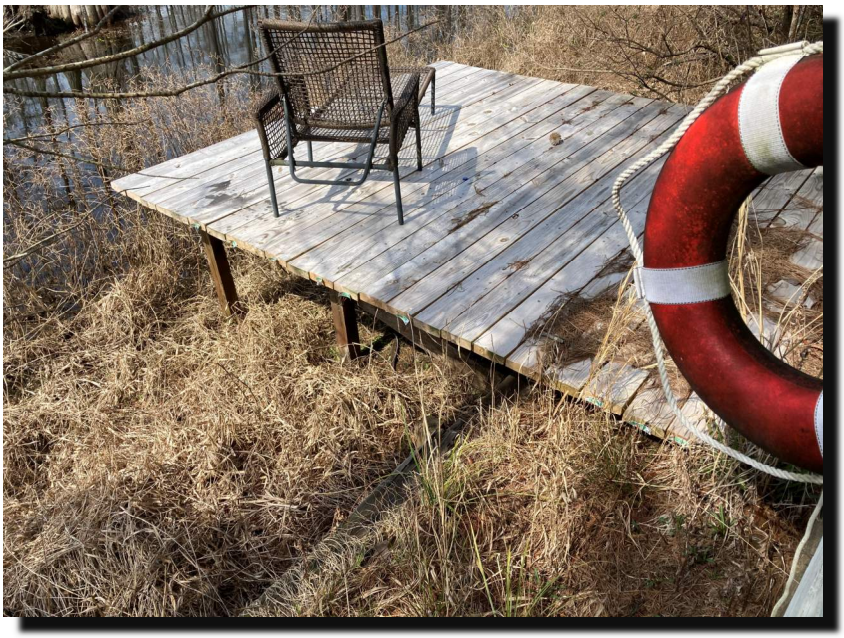


Photo 23

The wood dock at the southwest corner of the shed is in good condition with no observed signs of damage or deterioration.

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *April 16, 2021*

Subject: *Big Rockfish Creek Outfall*
7105 Mariners Landing Drive
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 7105 Mariners Landing Drive, Fayetteville, NC 28306 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on March 12, 2021 to evaluate structures that were located near or within the easements. The site evaluation was a limited structural visual inspection. The backyard was fenced in, so CDM Smith was unable to access the backyard, which only contained a trampoline and children's slide. Any visual damage or deterioration to permanent structures was noted.

The proposed pipe is located along the east edge of the property. The only permanent structure on the property is the house, which is located approximately 40 feet from the proposed pipe. The proposed pipe is approximately 20 feet deep and is located within a steel pipe casing. Due to the distance of the pipe from the house and the jack and bore method used to install the pipe, it is unlikely that any of the structures on the property will be adversely affected by the proposed construction.

If you have any comments or questions regarding the structural property evaluations, please contact us.

7105 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 1

The front (south side) of the house is in good condition with no observed signs of damage or deterioration.

Photo 2

The west side of the house is also in good condition with no apparent signs of damage or deterioration. There is some staining of the concrete driveway in front of the garage doors.

7105 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 3

The east side of the house is in good condition. In the clouded region to the right, there is some minor staining on the siding. In the clouded region to the left, there is some cracking in the bricks at the foundation (see Photo 4).

Photo 4

There is some minor cracking in the clouded regions on the east side of the house near the power transformer box. The cracks do not appear to span the full height of the brick foundation.

7105 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 5

The driveway is in good condition. CDM Smith did not observe any cracking in the concrete driveway, but there are several stains along the length of the driveway.

Photo 6

The wood fence on the east side of the property is in good condition, and the children's playset appears to be in good condition, but CDM Smith was unable to closely inspect the playset. The proposed pipe will be installed via jack and bore at the east edge of the property, and the pipe should not impact the playset or fence.

7105 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 7

This picture was taken from the southeast corner of the property looking toward the North. The proposed pipe will be located along the east edge of the property. There are no structures on this property in the front yard that are within the proposed limits of disturbance.

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *April 16, 2021*

Subject: *Big Rockfish Creek Outfall*
7115 Mariners Landing Drive
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 7115 Mariners Landing Drive, Fayetteville, NC 28306 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on March 12, 2021 to evaluate structures that were located near or within the easements. The site evaluation was a limited structural visual inspection. The backyard was fenced in, so CDM Smith was unable to access the backyard, which only contained the back sides of the house and detached garage. Any visual damage or deterioration to permanent structures was noted.

The proposed pipe is located along the west edge of the property. The house and the detached garage are located greater than 75 feet from the pipe, which is approximately 20 feet deep. Due to the jack and bore method used to install the pipe and the distance of the pipe from the house and garage, it is unlikely that the house or garage will be adversely affected by the proposed construction. The detached covered patio on the west side of the property is located approximately 25 feet from the proposed pipe. Since the jack and bore method will be used to install the pipe, it is unlikely that the covered patio will be affected by the construction. The jack and bore receiving pit is located approximately 80 feet from the patio and should not adversely affect the patio.

If you have any comments or questions regarding the structural property evaluations, please contact us.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 1

The front (south) sides of the main house and garage are in good condition with no observed signs of damage or deterioration to either structure.

Photo 2

The front porch at the house and the concrete sidewalk in front of the house are in good condition. The concrete driveway in front of the house has vegetation growing through multiple joints.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 3

The west side of the house appears to be in good condition with no observed signs of damage or deterioration. The house is located over 130 feet from the proposed pipeline, so the house should not be affected by the proposed construction.

Photo 4

To the west of the house, there is a covered walkway leading to a detached garage with a loft. The covered walkway and garage appear to be in good condition with no apparent signs of deterioration or damage. The garage is located approximately 80 feet from the proposed pipe, which is located on the west border of the property. The garage should not be adversely affected by the proposed construction. The driveway has some staining.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 5

The concrete driveway leading to the detached garage has significant cracking in the clouded region shown in Photo 5.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 6

There is a covered patio constructed primarily with wood. The patio is located on a concrete slab on the west edge of the front yard. The patio roof appears to be in good condition. This picture was taken of the north side of the patio.

Photo 7

There is a concrete sidewalk leading into the east side of the patio. The light on the brick pier is broken. The concrete sidewalk is heavily stained.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 8

The concrete slab is in fair condition. There are a lot of pine needles and other leaves over the slab. Some of the leaves have decomposed and heavily stained the concrete. There is a crack in the slab in the clouded region shown in the southwest corner of the slab (see Photo 9).

Photo 9

In the clouded region, there is a small crack in the concrete slab extending from under the purple rocking chair.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 10

At the south side of the covered patio, in the clouded region, the siding is warped near grade.

Photo 11

The fence to the west of the garage is in good condition. The survey stakes are shown in this picture. The proposed pipe will be installed with the jack and bore installation method. The fence should not be adversely affected by the proposed construction.

7115 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 12

At the southwest corner of the property, there is a lawn irrigation box. Due to the depth of the proposed pipe and because the pipe will be installed via jack and bore, the lawn irrigation box should not be adversely affected by the proposed construction.

Memorandum

To: *Scott Sigmon, PE*

From: *Justin S. Boggs, PE*

Date: *April 16, 2021*

Subject: *Big Rockfish Creek Outfall*
7345 Mariners Landing Drive
Structural Property Evaluations

CDM Smith performed a structural property evaluation at 7345 Mariners Landing Drive, Fayetteville, NC 28306 as a part of the Big Rockfish Creek Outfall (BRCO) sanitary sewer pipe project. CDM Smith visited this property on March 12, 2021 to evaluate structures that were located near or within the easements. The site evaluation was a limited structural visual inspection. The backyard was fenced in, so CDM Smith was unable to access the backyard, which contains an in-ground pool, shed, patio, and boat dock. Any visual damage or deterioration observed during the evaluation was noted.

The proposed pipe is located in the front yard (north side) of the property. The house is located greater than 80 feet from the pipe, which is approximately 26 feet deep. Due to the jack and bore method used to install the pipe and the distance of the pipe from the house, it is unlikely that the house will be adversely affected by the proposed construction. The jack and bore pits are located more than 100 feet from the house and will not adversely affect the house.

If you have any comments or questions regarding the structural property evaluations, please contact us.

7345 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 1

The front (north side) of the house is in good condition with no observed signs of damage or deterioration.

Photo 2

The west side of the house is in good condition with no signs of damage or deterioration.

7345 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

Photo 3

The east side of the house is in good condition with no signs of damage or deterioration.

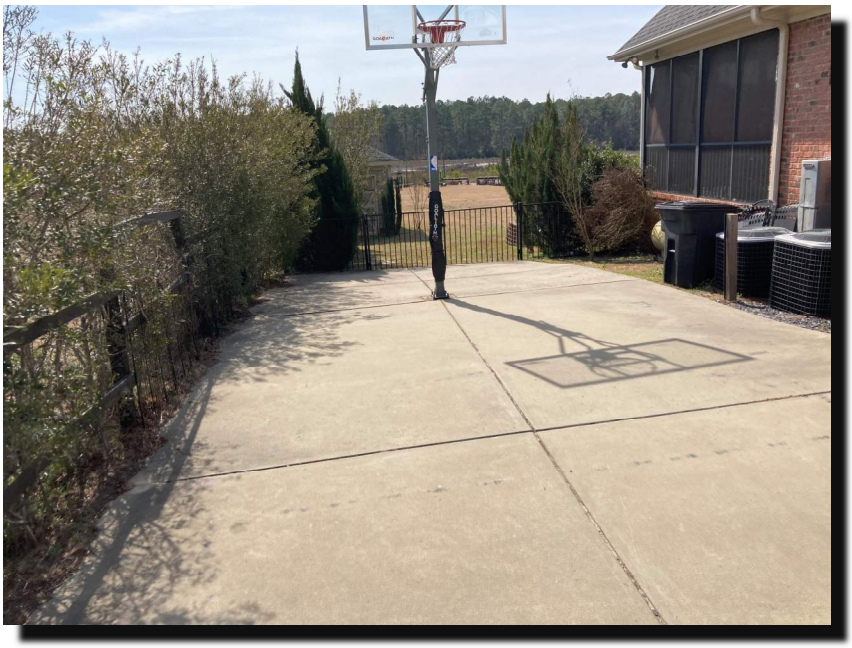


Photo 4

The south end of the driveway is in good condition. There is some minor staining of the concrete driveway near the garage. The backyard is fenced in, so CDM Smith was unable to provide a detailed inspection of structures located in the backyard. The proposed pipeline is located in the front yard of the property, so no structures in the backyard should be impacted by the proposed construction.

7345 Mariners Landing Drive
Fayetteville, NC 28306

Date Observed:
March 12, 2021

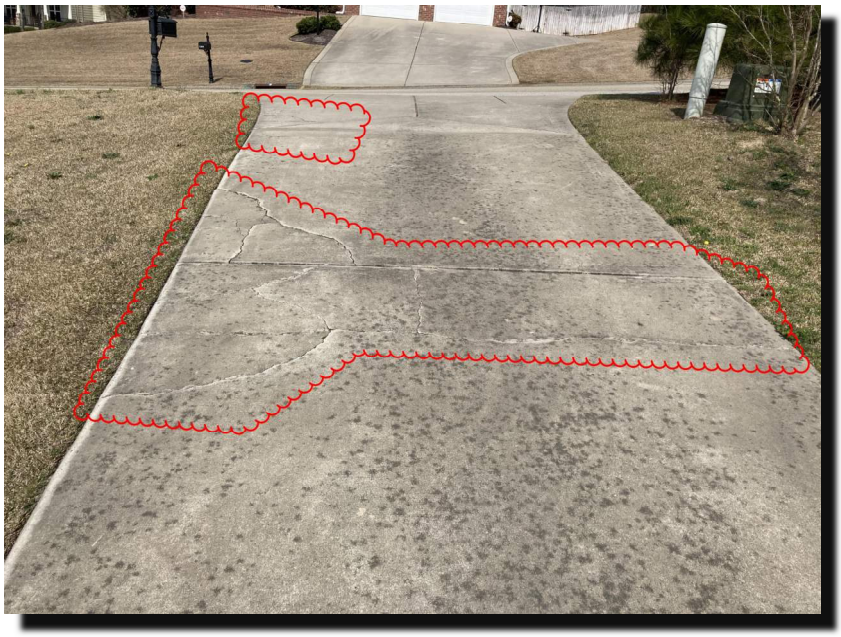


Photo 5

At the north end of the concrete driveway, there are two areas of cracking shown in the clouded regions. The clouded region at the top of the picture is shown in detail in Photo 6. The driveway also has some minor staining.

Photo 6

At the northwest corner of the driveway, there is some minor cracking.

7345 Mariners Landing Drive
Fayetteville, NC 28306

Photo 7

Date Observed:
March 12, 2021

The proposed pipe is planned to cross the front yard of the property, extending from the middle of Mariners Landing Drive to the property east of 7345 Mariners Landing Drive. As can be seen in the picture, there are no structures in the front yard. The pipe will cross under the driveway, but the driveway should not be adversely affected by the jack and bore operation.

Appendix E
Well Abandonment & Relocation Plans

PWC

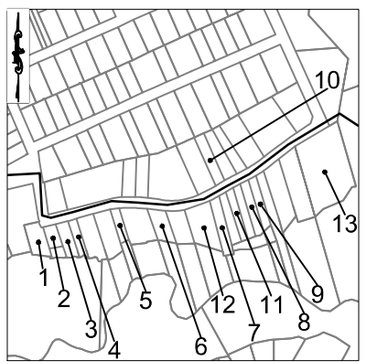
Fayetteville's HOME TOWN UTILITY

FAYETTEVILLE, N.C.

BIG ROCKFISH CREEK OUTFALL ADDITIONAL SERVICES

WELL RELOCATION ON LAKEVIEW DRIVE

VICINITY MAP
1"=6,500'



SCALE: 1" = 1,000'

SHEET INDEX		
SHEET NO.	PROPERTY OWNER	SITE ADDRESS
00	COVER	
1	ELLIS E EHLE	2673 LAKE VIEW DR
2	ELLIS E EHLE JR	2667 LAKEVIEW DR
3	JEFFREY M BRYANT	2659 LAKEVIEW DR
4	CATHERINE D PHIPPS	2653 LAKEVIEW DR
5	WILLIAM K & WILLIAM H DEAN	2623 LAKEVIEW DR
6	AUDREY L STONE	2603 LAKEVIEW DR
7	SAMUEL O JR & DENISE D HUGGINS	2571 LAKEVIEW DR
8	ALTON LOCKLEAR LIFE ESTATE	2551 LAKEVIEW DR
9	DEBORAH L WILLIFORD	2545 LAKEVIEW DR
10	HELGA NIEDENTHAL	2564 LAKEVIEW DR
11	SAMUEL O JR & DENISE D HUGGINS	2561 LAKEVIEW DR
12	BRANT, ELLIS M & DEBORAH F	2583 LAKEVIEW DR
13	SCOTT R LANCE & SARAH MARET GURNEY	2507 LAKEVIEW DR

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:26 AM

OCTOBER 17, 2022

100% DESIGN DOCUMENT - FOR BIDDING PURPOSES ONLY

WK DICKSON
community infrastructure consultants
Transportation + Water Resources
Urban Development + Geomatics
720 Corporate Center Drive
Raleigh, North Carolina 27607
(v) 919.782.0495
(f) 919.782.9672
www.wkdickson.com
NC. LICENSE NO. F-0374

811 Know what's below. Call before you dig.

MCKIM&CREED

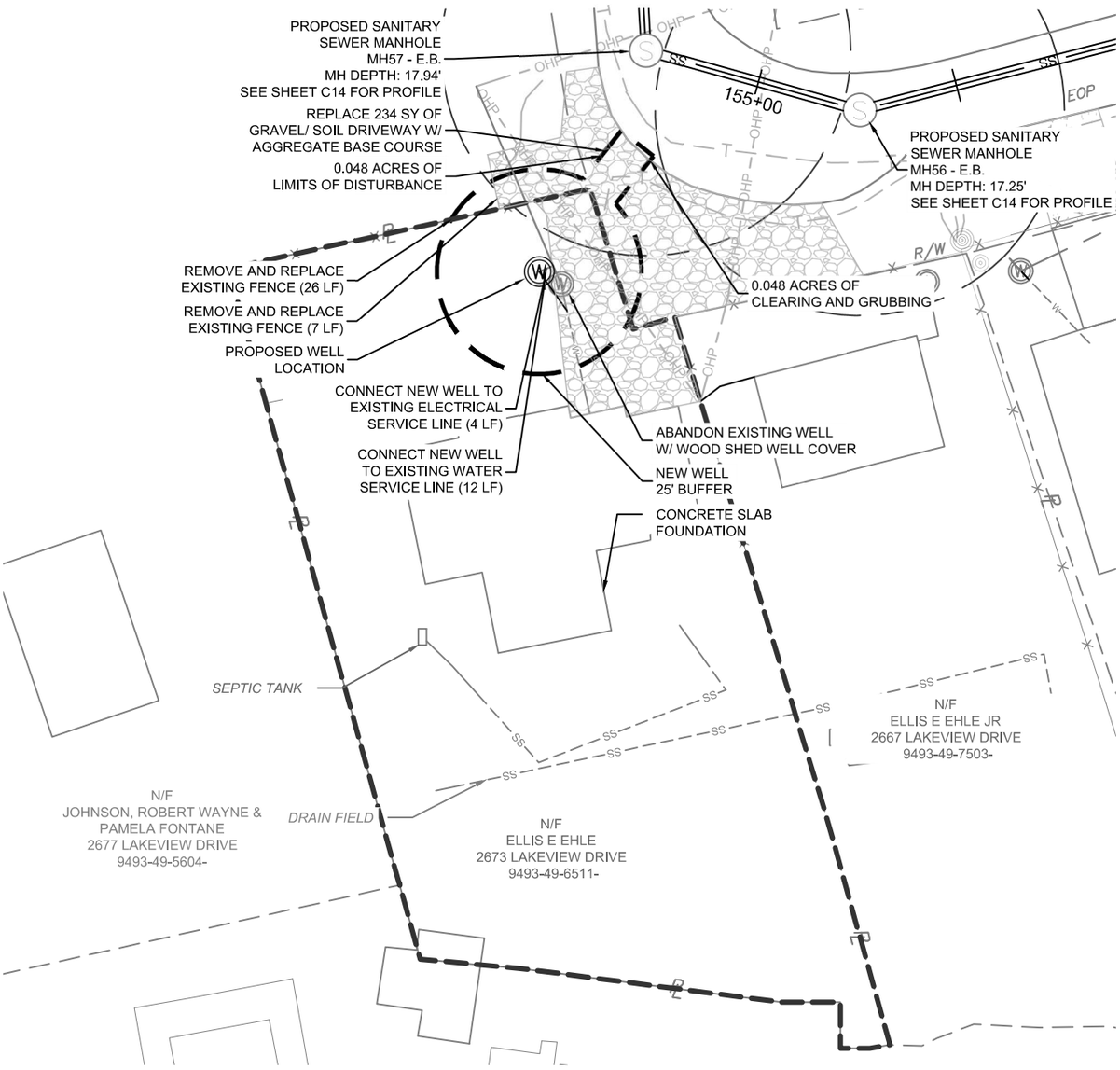
PWC PROJ #BS-15614
WKD PROJ #20200629.00.RA

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
ELLIS E EHLE
2673 LAKEVIEW DR
PIN# 9493-49-6511

SCALE: 1" = 40'

0' 40' 80'



LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
℄	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

NOTES:
1. CONTRACTOR TO PROVIDE ACCESS TO PROPERTY TO THE PROPERTY OWNER AT ALL TIMES.
2. CONTRACTOR SHALL FOLLOW WELL PERMIT AND ALL FEDERAL, STATE, AND LOCAL CODES AND REGULATIONS.
3. CONTRACTOR SHALL ABANDON WELLS PER STATE AND LOCAL REQUIREMENTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL UNDERGROUND UTILITIES PRIOR TO INITIATING GROUND BREAKING ACTIVITIES.
5. CLEARING AND GRUBBING WILL BE QUANTIFIED AND PAID BASED UPON A PER ACREAGE BASIS.
6. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA.
7. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM & CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16."
8. THE EXISTING WELL, PROPOSED WELL, AND EXISTING SEPTIC TANK/DRAIN FIELD WERE LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
9. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.
10. CONTRACTOR SHALL COMPLETE WELLS SUCH THAT THE SCREENED INTERVAL IS INSTALLED BELOW A LITHOLOGICAL CONFINING LAYER LOCATED AT A GREATER DEPTH THAN THE SANITARY SEWER.
11. CONTRACTOR IS TO RECONNECT ALL ELECTRICAL AFFECTED BY WELL RELOCATION WORK.
12. CONTRACTOR IS TO VERIFY THAT THE EXISTING ELECTRICAL BOX IS SUFFICIENT TO POWER NEW PUMP. IN THE OCCURRENCE THAT IT IS NOT ADEQUATE THE CONTRACTOR IS TO REMOVE AND REPLACE WITH A NEW ELECTRICAL BOX TO MEET THE DEMAND OF THE NEW WELL PUMP.
13. CONTRACTOR IS TO CONNECT EXISTING PLUMBING TO NEW PLUMBING.
14. CONTRACTOR SHALL REPLACE EXISTING PUMP ENCLOSURE WITH A NEW ENCLOSURE EQUAL IN LIKENESS. CONTRACTOR TO REMOVE AND PROPERLY DISPOSE OF EXISTING PUMP ENCLOSURE.
15. CONTRACTOR TO COORDINATE SCHEDULE AND REMOVAL OF EXISTING FENCE WITH PROPERTY OWNER PRIOR TO COMPLETING FENCE REMOVAL ACTIVITIES. FOLLOWING COMPLETION OF WELL INSTALLATION ACTIVITIES, THE CONTRACTOR SHALL INSTALL A NEW PERMANENT FENCE OF EQUAL LIKENESS TO REPLACE THE REMOVED FENCE.
16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

PWC PROJ #BS-15614

Oct 18 2022 8:27 AM

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED		DATE	REVISIONS	BY
LAYOUT BY: LJG	DATE: 10/4/22			
PLAN/PROF. BY: LJG				
DESIGN REVIEW BY: W/R ENGR. DEPT.				
APPROVED BY: AMH				
SCALE: HOR: 1"= 40'		SHT: 1 OF 13	20200629.00.RA	

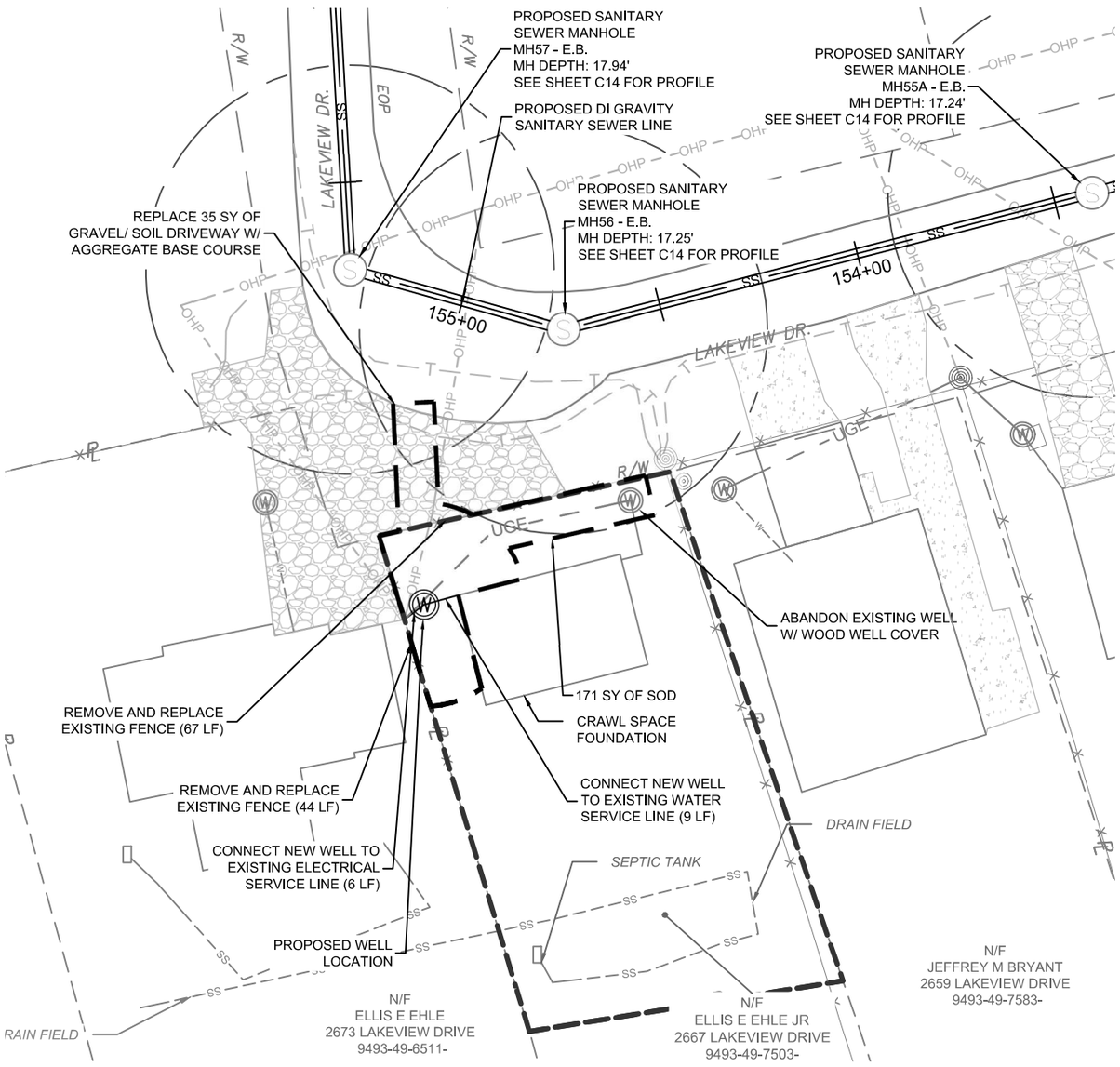
z:\Projects\fayetteville public works commission\20200629.00ra - big rockfish creek outfall add'l svcs\CADD\Plan Set\20200629.00RA_WELLS_EAST.dwg 10/11/2022 5:40:05 PM

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 2
WELL RELOCATION
ON THE LANDS OF
ELLIS E EHLE JR
2667 LAKEVIEW DR
PIN# 9493-49-7503

SCALE: 1" = 40'

0' 40' 80'



LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P/L	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

NOTES:
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3. CONTRACTOR SHALL ABANDON WELLS PER STATE AND LOCAL REQUIREMENTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL UNDERGROUND UTILITIES PRIOR TO INITIATING GROUND BREAKING ACTIVITIES.
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9. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.
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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:27 AM

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED	
LAYOUT BY: LJG	DATE: 10/4/22
PLAN/PROF. BY: LJG	
DESIGN REVIEW BY: W/R ENGR. DEPT.	
APPROVED BY: AMH	
SCALE: HOR: 1"= 40'	

DATE	REVISIONS	BY

SHT: 2 OF 13 | 20200629.00.RA

z:\Projects\fayetteville public works commission\20200629.00ra – big rockfish creek outfall add'l svcs\CADD\Plan Set\20200629.00RA_WELLS_EAST.dwg 10/11/2022 5:40:08 PM

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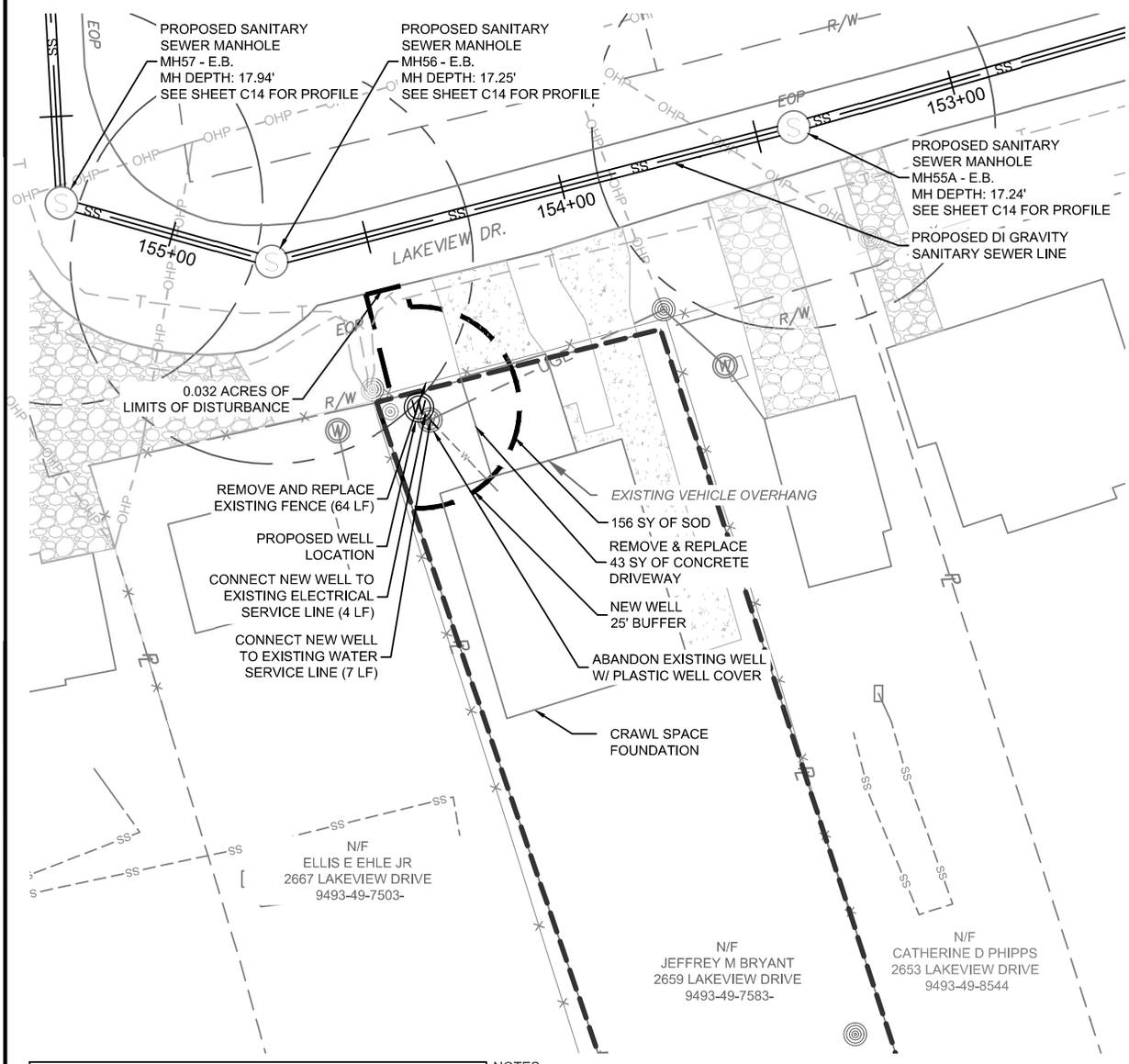
EXHIBIT MAP 3
WELL RELOCATION
ON THE LANDS OF
JEFFREY M BRYANT
2659 LAKEVIEW DR
PIN# 9493-49-7583

SCALE: 1" = 40'

0' 40' 80'



LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

NOTES:
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5. CLEARING AND GRUBBING WILL BE QUANTIFIED AND PAID BASED UPON A PER ACREAGE BASIS.
6. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA.
7. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM & CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16."
8. THE EXISTING WELL, PROPOSED WELL, AND EXISTING SEPTIC TANK/DRAIN FIELD WERE LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

PWC PROJ #BS-15614

Oct 18 2022 8:28 AM

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED	
LAYOUT BY: LJG	DATE: 10/4/22
PLAN/PROF. BY: LJG	
DESIGN REVIEW BY: W/R ENGR. DEPT.	
APPROVED BY: AMH	
SCALE: HOR: 1"= 40'	

DATE	REVISIONS	BY

SHT:3 OF 13 | 20200629.00.RA

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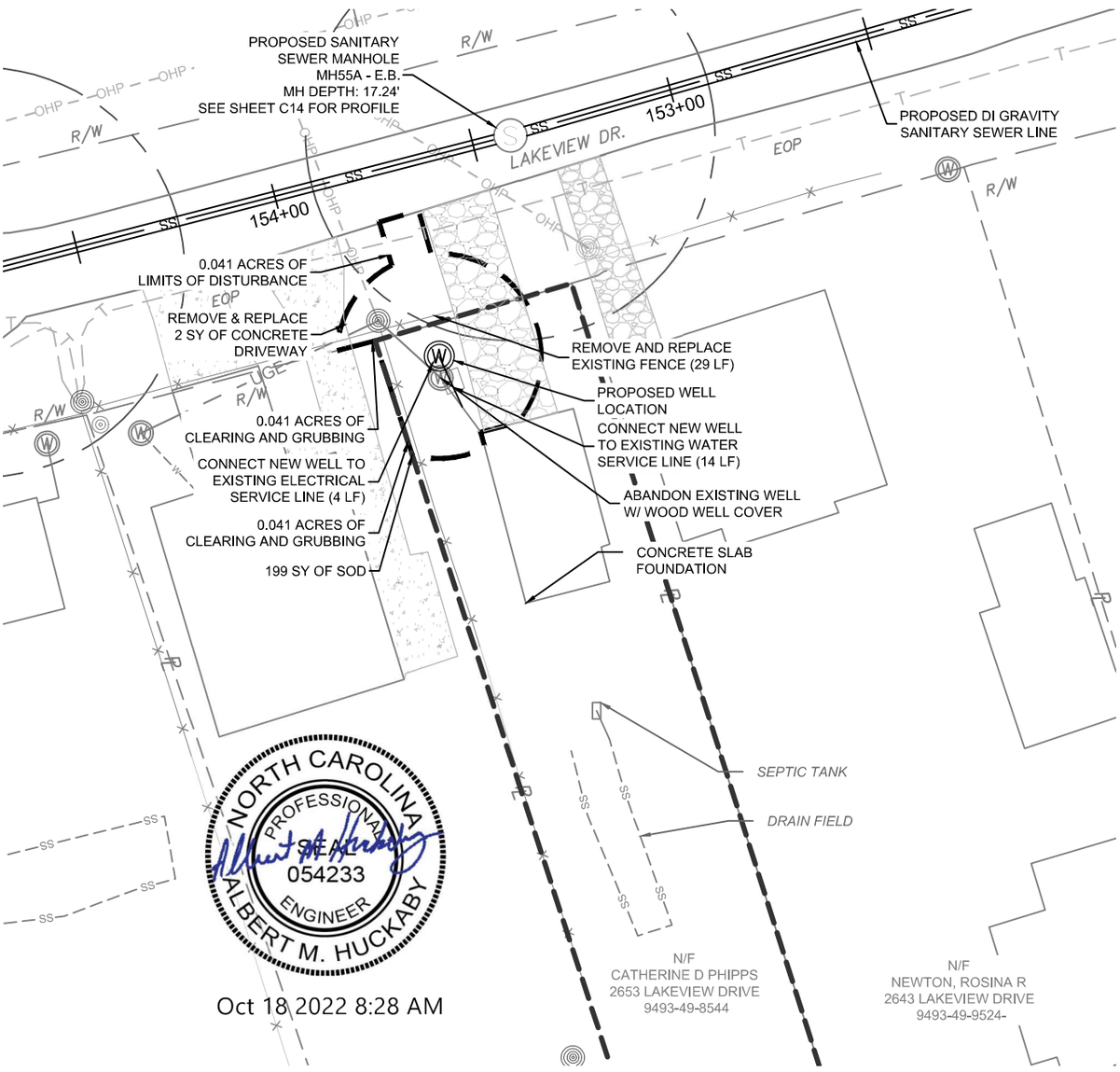
EXHIBIT MAP 4
WELL RELOCATION
ON THE LANDS OF
CATHERINE D PHIPPS
2653 LAKEVIEW DR
PIN# 9493-49-8544

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:28 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT:4 OF 13 | 20200629.00.RA

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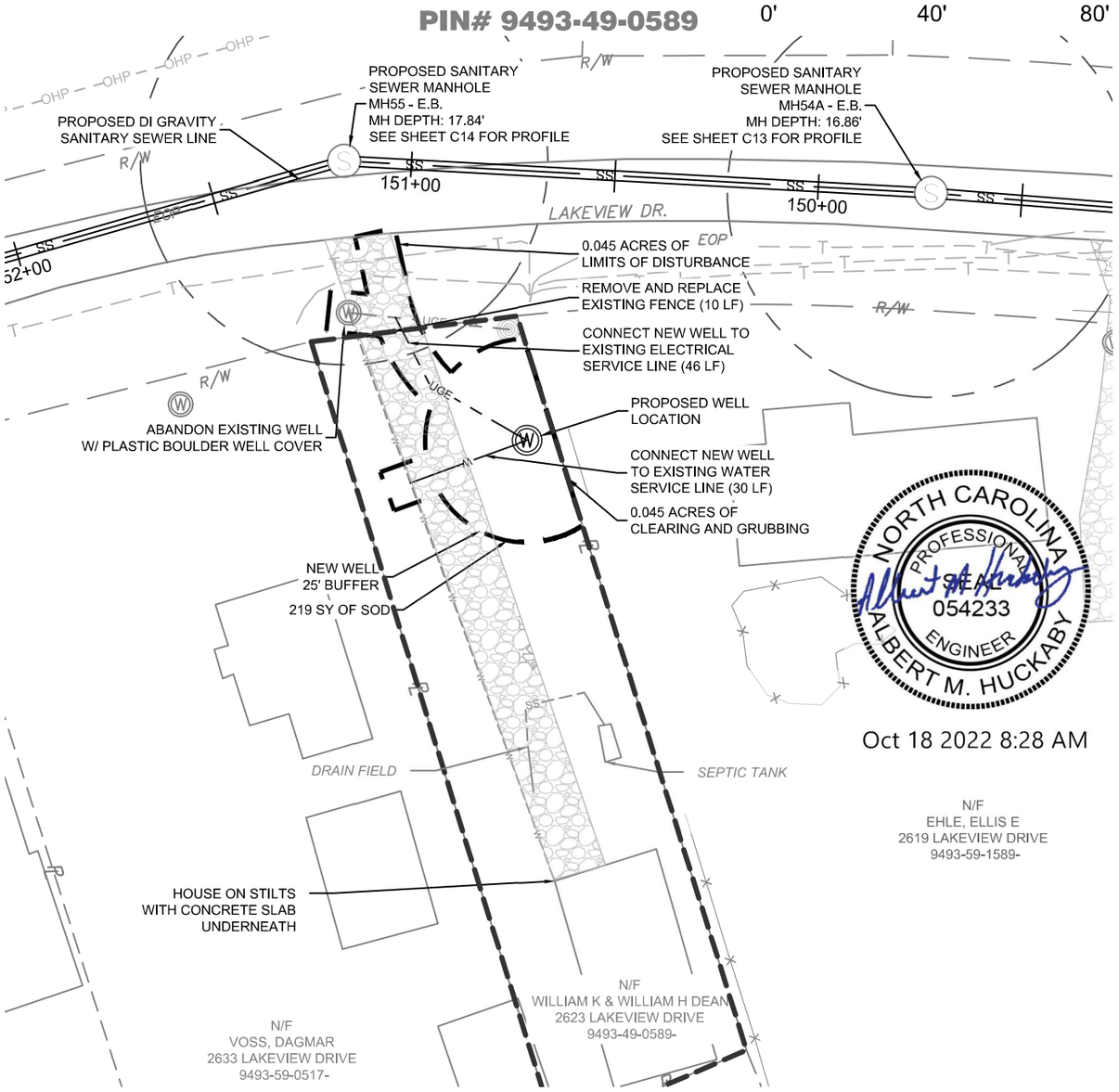
EXHIBIT MAP 5
WELL RELOCATION
ON THE LANDS OF
WILLIAM K & WILLIAM H DEAN
2623 LAKEVIEW DR
PIN# 9493-49-0589

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:28 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P/L	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

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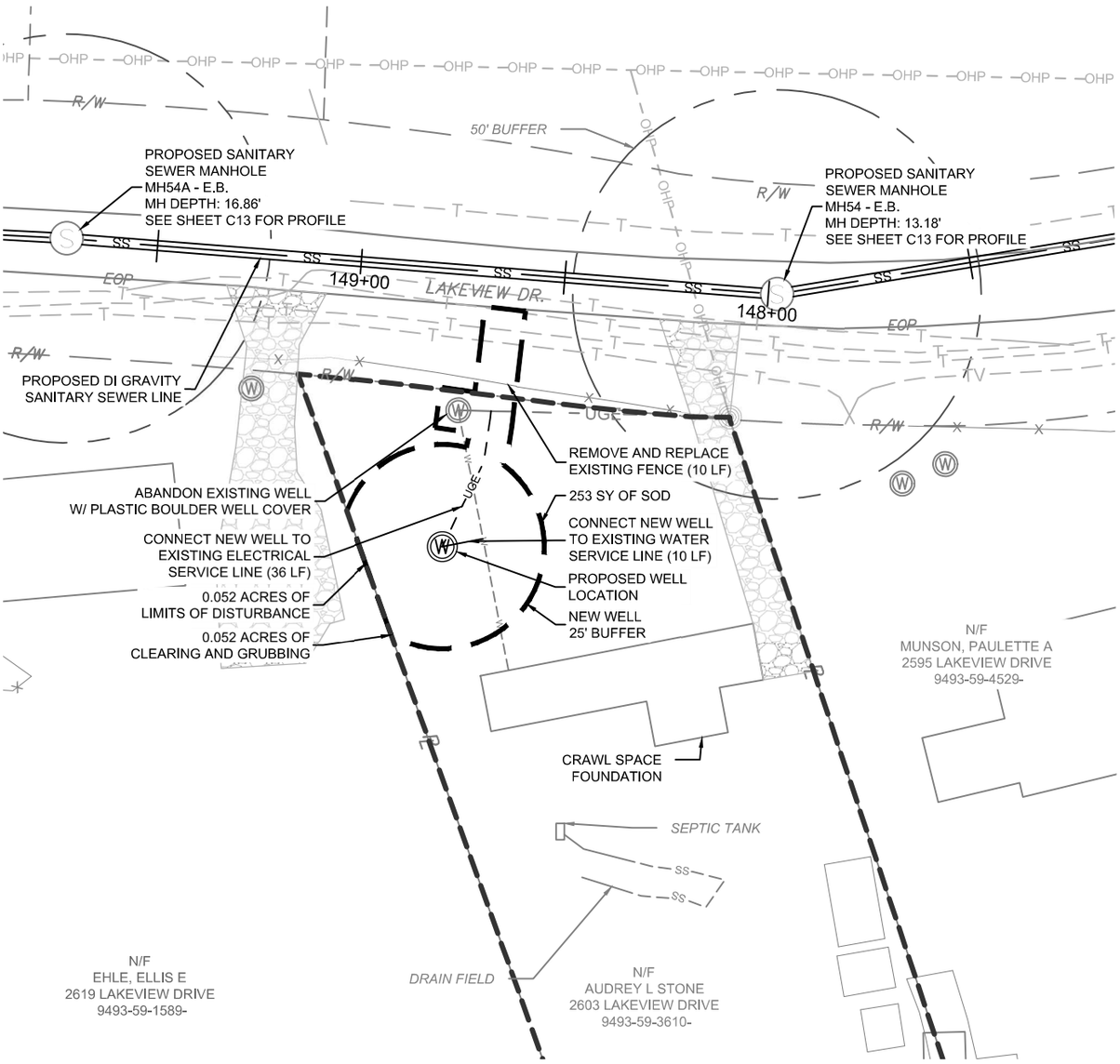
EXHIBIT MAP 6
WELL RELOCATION
ON THE LANDS OF
AUDREY L STONE
2603 LAKEVIEW DR
PIN# 9493-59-3610

SCALE: 1" = 40'

0' 40' 80'



LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
PL	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:29 AM

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT:6 OF 13 20200629.00.RA

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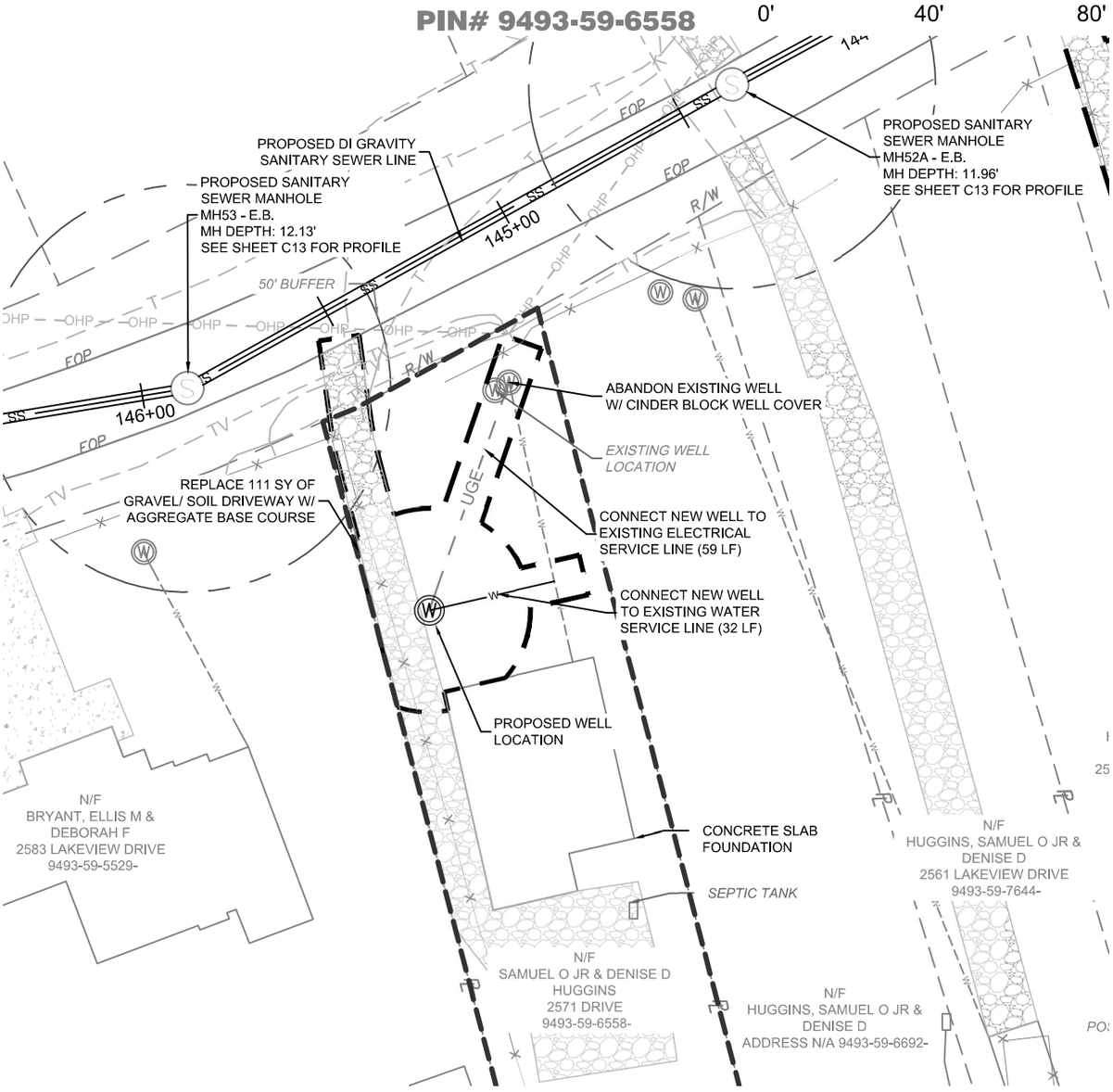
EXHIBIT MAP 7
WELL RELOCATION ON THE LANDS OF SAMUEL O JR & DENISE D HUGGINS
2571 LAKEVIEW DR
PIN# 9493-59-6558

SCALE: 1" = 40'

0' 40' 80'



LEGEND

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SS	PROPOSED GRAVITY SANITARY SEWER
PL	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
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W	PROPOSED WELL
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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

PWC PROJ #BS-15614

Oct 18 2022 8:29 AM

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED	
LAYOUT BY: LJG	DATE: 10/4/22
PLAN/PROF. BY: LJG	
DESIGN REVIEW BY: W/R ENGR. DEPT.	
APPROVED BY: AMH	
SCALE: HOR: 1"= 40'	

DATE	REVISIONS	BY

SHT:7 OF 13 | 20200629.00.RA

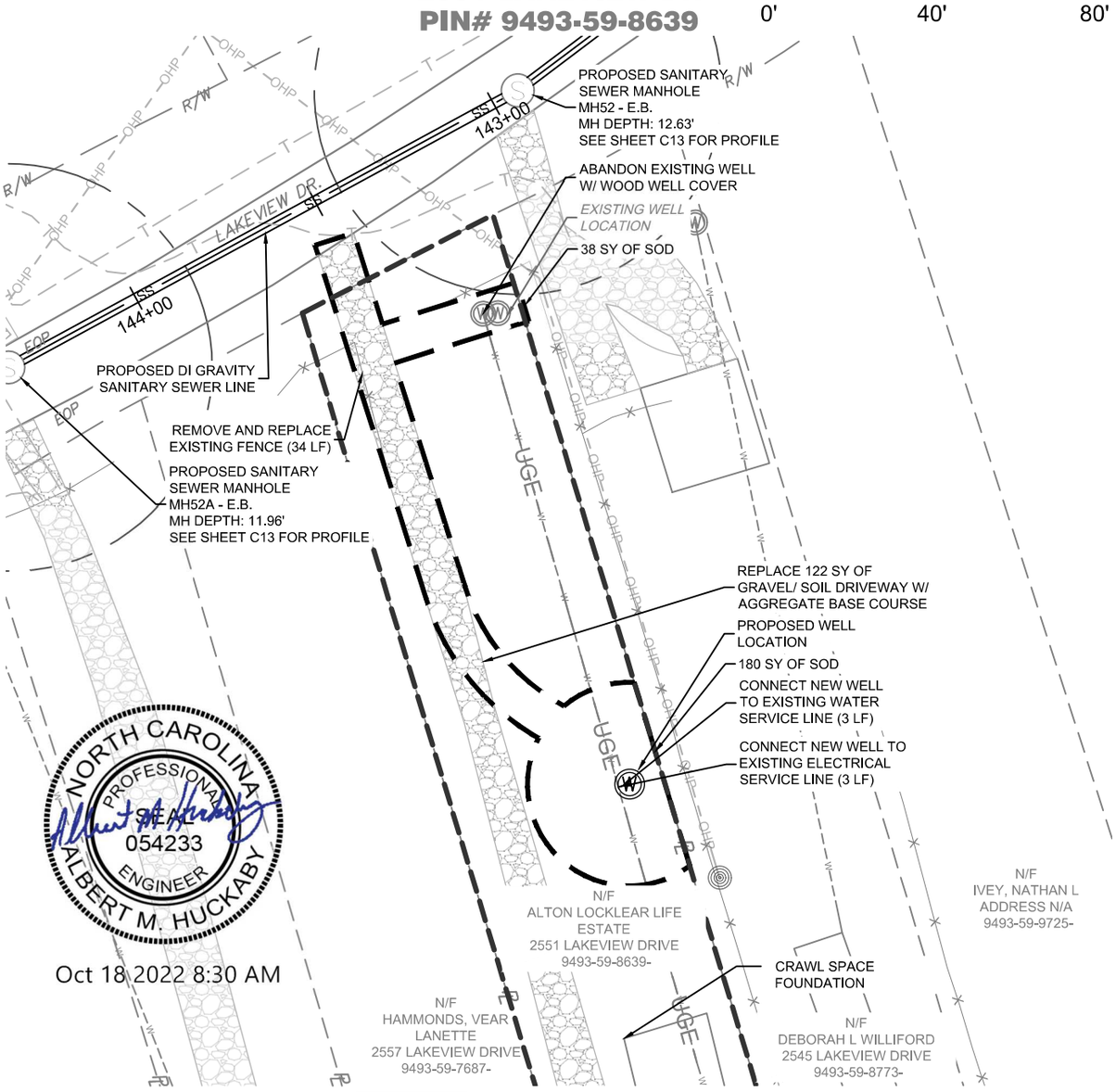
z:\Projects\fayetteville public works commission\20200629.00ra – big rockfish creek outfall add'l svcs\CADD\Plan Set\20200629.00RA_WELLS_EAST.dwg 10/11/2022 5:40:33 PM

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 8
WELL RELOCATION ON THE LANDS OF ALTON LOCKLEAR LIFE ESTATE
2551 LAKEVIEW DR
PIN# 9493-59-8639

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:30 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
PL	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

NOTES:
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6. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA.
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8. THE EXISTING WELL, PROPOSED WELL, AND EXISTING SEPTIC TANK/DRAIN FIELD WERE LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT:8 OF 13 | 20200629.00.RA

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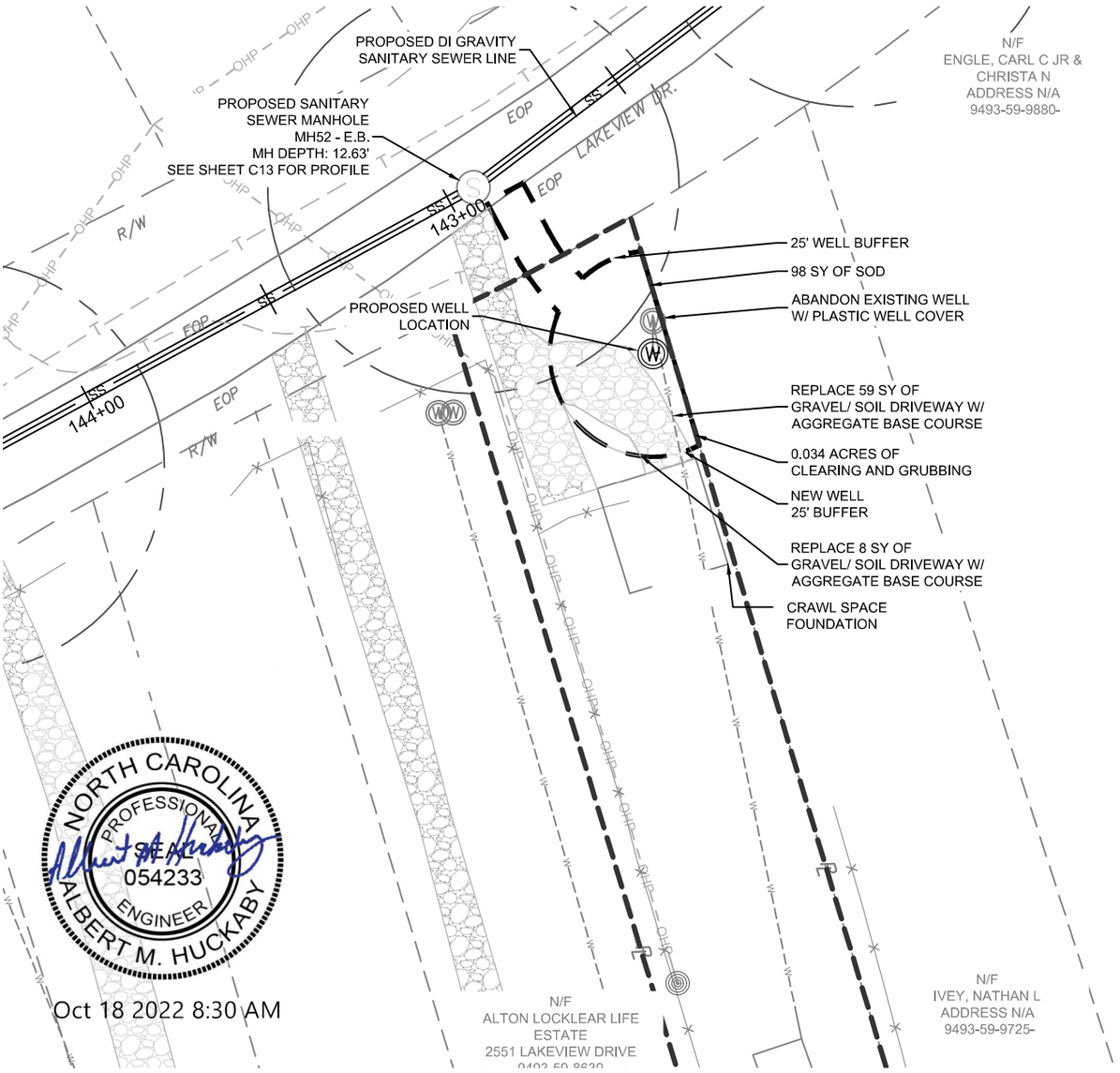
EXHIBIT MAP 9
WELL RELOCATION
ON THE LANDS OF
DEBORAH L WILLIFORD
2545 LAKEVIEW DR
PIN# 9493-59-8773

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:30 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT:9 OF 13 | 20200629.00.RA

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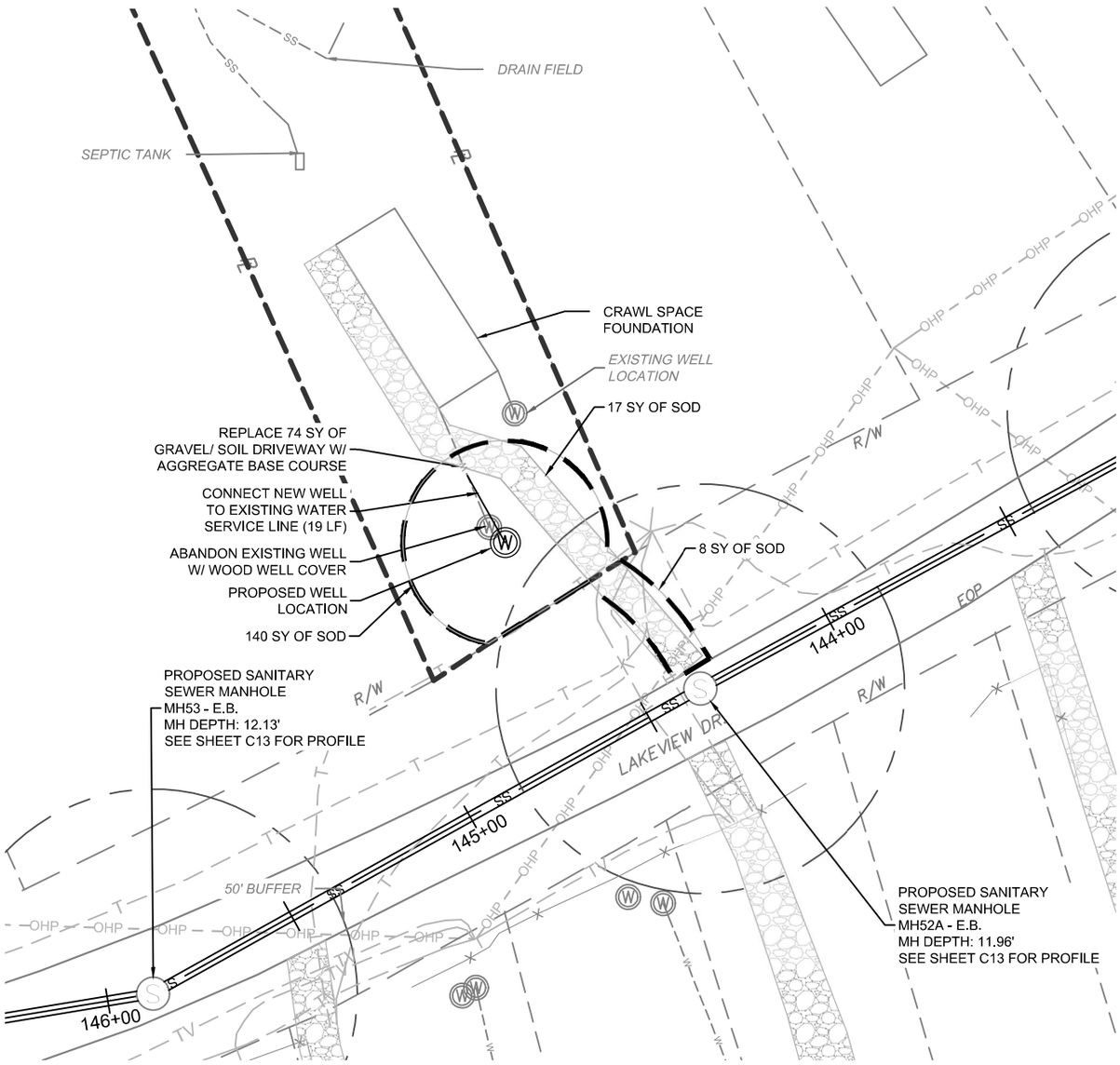
EXHIBIT MAP 10
WELL RELOCATION
ON THE LANDS OF
HELGA NIEDENTHAL
2564 LAKEVIEW DR
PIN# 9493-59-5997

SCALE: 1" = 40'

0' 40' 80'



LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
PL	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

PWC PROJ #BS-15614

Oct 18 2022 8:30 AM

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED		DATE	REVISIONS	BY
LAYOUT BY: LJG	DATE: 10/4/22			
PLAN/PROF. BY: LJG				
DESIGN REVIEW BY: W/R ENGR. DEPT.				
APPROVED BY: AMH				
SCALE: HOR: 1"=40'		SHT: 10 OF 13	20200629.00.RA	

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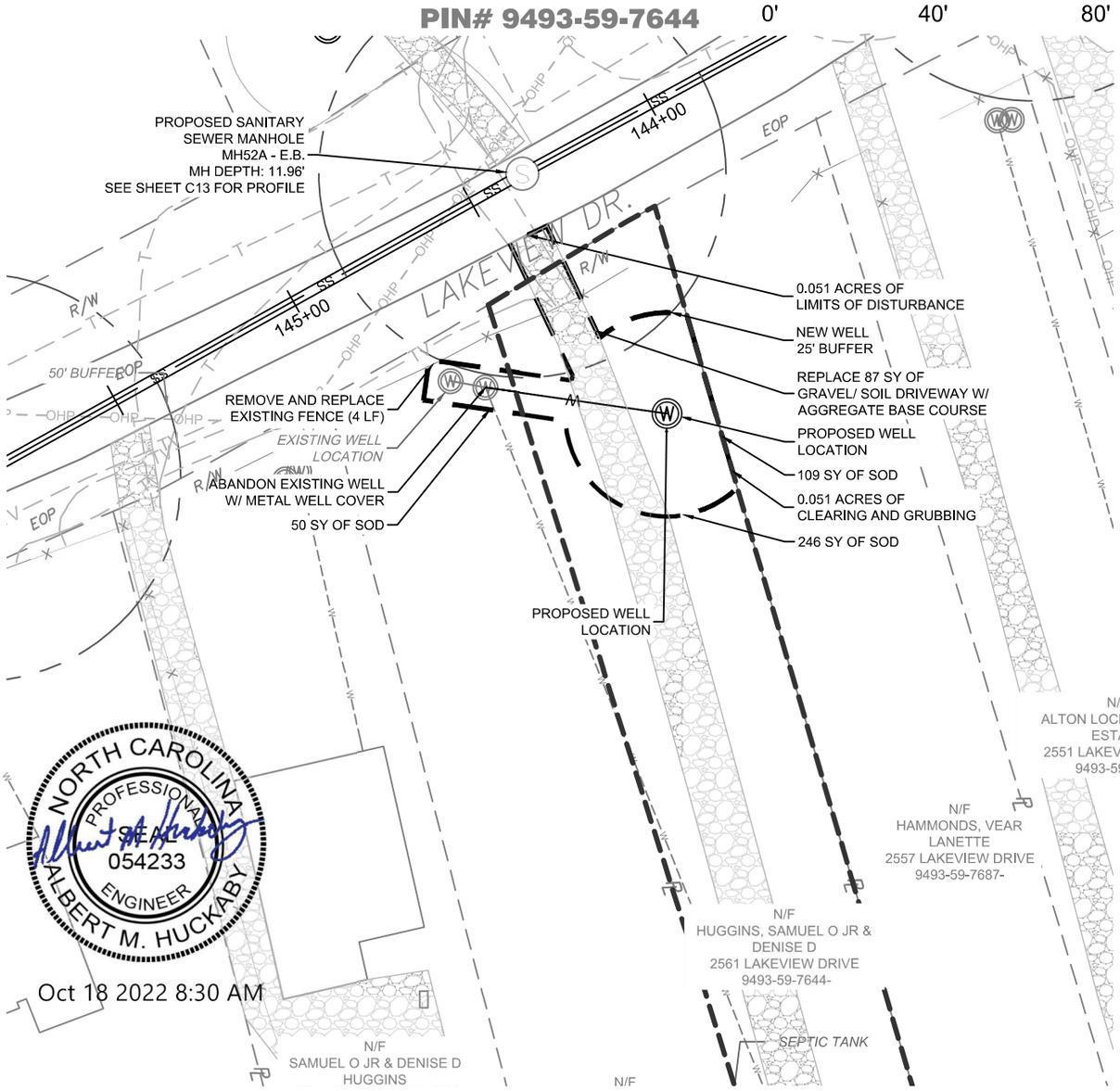
EXHIBIT MAP 11
WELL RELOCATION
ON THE LANDS OF
SAMUEL O JR & DENISE D HUGGINS
2561 LAKEVIEW DR
PIN# 9493-59-7644

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:30 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

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16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT:11 OF 13 20200629.00.RA

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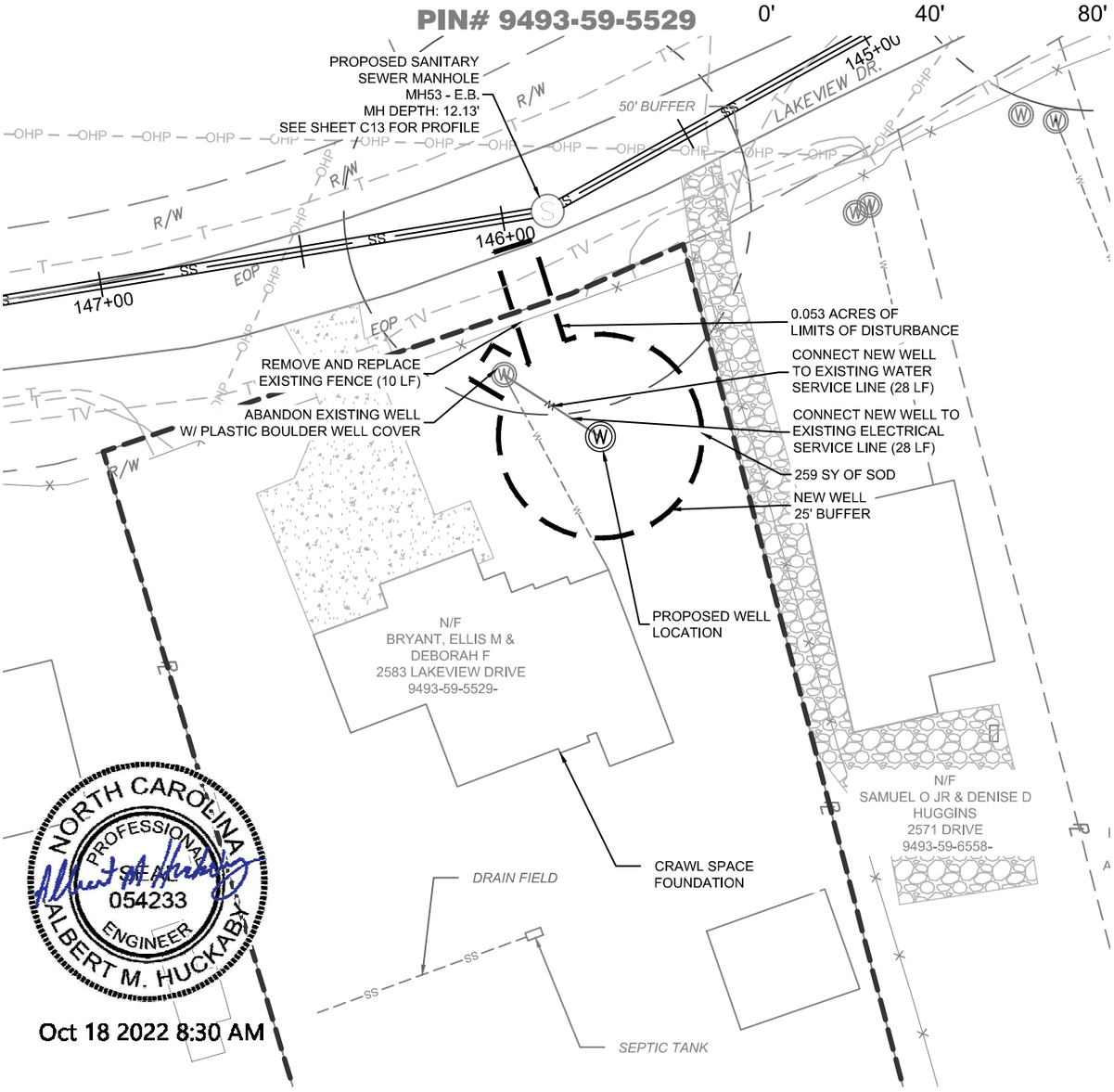
EXHIBIT MAP 12
WELL RELOCATION ON THE LANDS OF BRYANT, ELLIS M & DEBORAH F
2583 LAKEVIEW DR
PIN# 9493-59-5529

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:30 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
PL	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
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SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"=40'

DATE	REVISIONS	BY

SHT:12 OF 13 20200629.00.RA

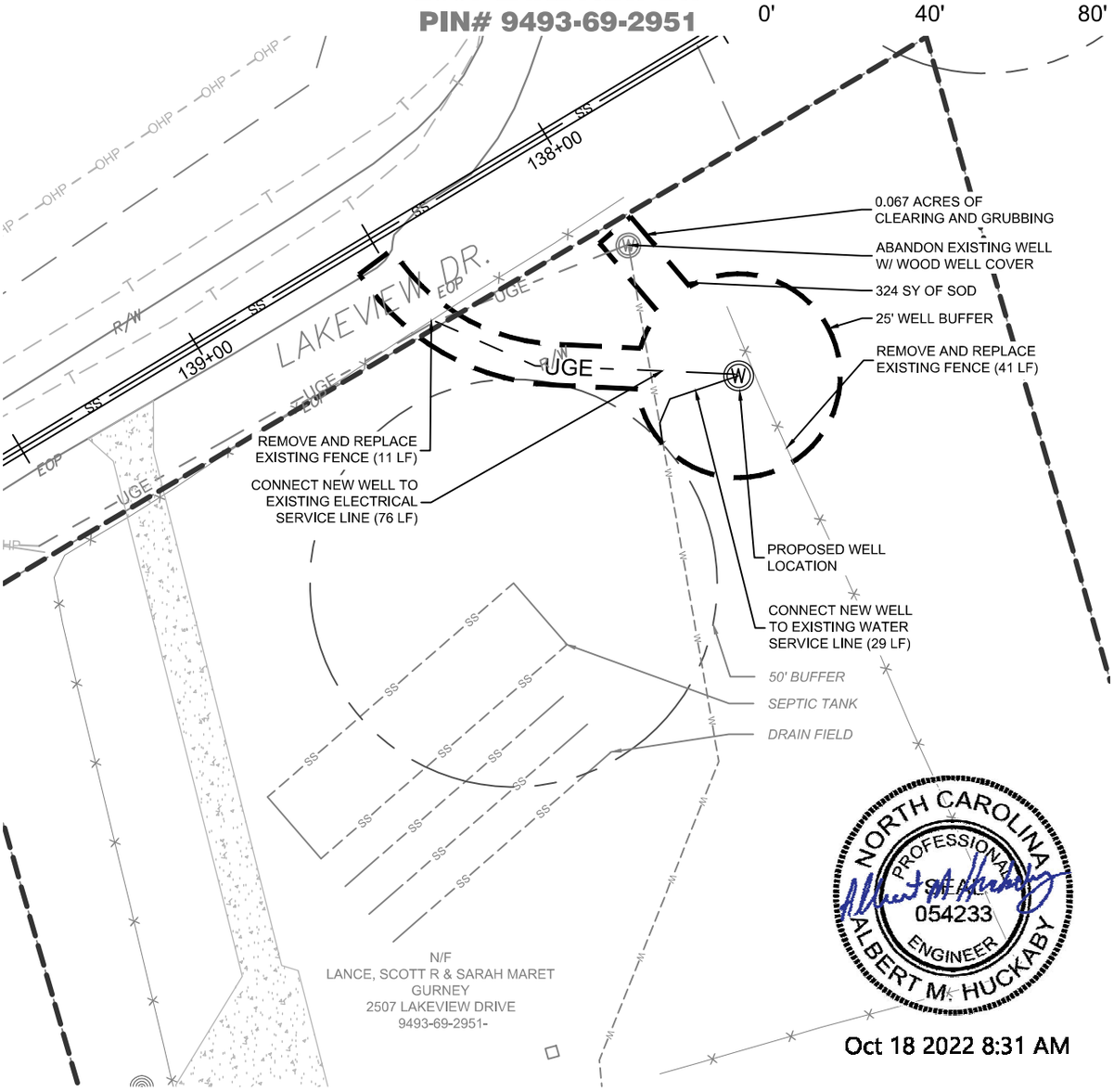
z:\Projects\fayetteville public works commission\20200629.00ra - big rockfish creek outfall add'l svcs\CADD\Plan Set\20200629.00RA_WELLS_EAST.dwg 10/11/2022 5:40:58 PM

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 13
WELL RELOCATION ON THE LANDS OF SCOTT R LANCE & SARAH MARET GURNEY
2507 LAKEVIEW DR
PIN# 9493-69-2951

SCALE: 1" = 40'

0' 40' 80'



NORTH CAROLINA PROFESSIONAL SEAL 054233 ENGINEER ALBERT M. HUCKABY

Oct 18 2022 8:31 AM

LEGEND

S	PROPOSED SANITARY SEWER MANHOLE
SS	PROPOSED GRAVITY SANITARY SEWER
P	PROPERTY LINE
SS	EXISTING SEPTIC SYSTEM
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY
T	TELEPHONE LINE
X	EXISTING FENCE LINE
OHP	EXISTING OVERHEAD POWER
UGE	EXISTING UNDERGROUND ELECTRICAL
W	EXISTING RESIDENTIAL WATER LINE
W	PROPOSED RESIDENTIAL WATER LINE
UGE	PROPOSED UNDERGROUND ELECTRICAL
W	PROPOSED WELL
W	EXISTING WELL
	EXISTING POWER POLE

NOTE FOR PROPERTY:
CONTRACTOR TO COORDINATE SCHEDULE AND INSTALLATION OF TEMPORARY FENCING WITH PROPERTY OWNER PRIOR TO REMOVAL OF EXISTING FENCE. CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING TEMPORARY FENCE THROUGHOUT WELL INSTALLATION ACTIVITIES AND SHALL HOLD SOLE RESPONSIBILITY FOR ANY EVENT RESULTING FROM UNSATISFACTORY TEMPORARY FENCE INSTALLATION. FOLLOWING COMPLETION OF WELL INSTALLATION ACTIVITIES, THE CONTRACTOR SHALL INSTALL A NEW PERMANENT FENCE OF EQUAL LIKENESS TO REMOVED FENCE.

ELECTRICAL GATE IS CONNECTED TO WELL POWER. IF/WHEN POWER IS RELOCATED THE ELECTRICIAN NEEDS TO DROP A LINE TO GET POWER BACK TO EXISTING GATE LINE.

NOTES:
1. CONTRACTOR TO PROVIDE ACCESS TO PROPERTY TO THE PROPERTY OWNER AT ALL TIMES.
2. CONTRACTOR SHALL FOLLOW WELL PERMIT AND ALL FEDERAL, STATE, AND LOCAL CODES AND REGULATIONS.
3. CONTRACTOR SHALL ABANDON WELLS PER STATE AND LOCAL REQUIREMENTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL UNDERGROUND UTILITIES PRIOR TO INITIATING GROUND BREAKING ACTIVITIES.
5. CLEARING AND GRUBBING WILL BE QUANTIFIED AND PAID BASED UPON A PER ACREAGE BASIS.
6. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA.
7. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM & CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16."
8. THE EXISTING WELL, PROPOSED WELL, AND EXISTING SEPTIC TANK/DRAIN FIELD WERE LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
9. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.
10. CONTRACTOR SHALL COMPLETE WELLS SUCH THAT THE SCREENED INTERVAL IS INSTALLED BELOW A LITHOLOGICAL CONFINING LAYER LOCATED AT A GREATER DEPTH THAN THE SANITARY SEWER.
11. CONTRACTOR IS TO RECONNECT ALL ELECTRICAL AFFECTED BY WELL RELOCATION WORK.
12. CONTRACTOR IS TO VERIFY THAT THE EXISTING ELECTRICAL BOX IS SUFFICIENT TO POWER NEW PUMP. IN THE OCCURRENCE THAT IT IS NOT ADEQUATE THE CONTRACTOR IS TO REMOVE AND REPLACE WITH A NEW ELECTRICAL BOX TO MEET THE DEMAND OF THE NEW WELL PUMP.
13. CONTRACTOR IS TO CONNECT EXISTING PLUMBING TO NEW PLUMBING.
14. CONTRACTOR SHALL REPLACE EXISTING PUMP ENCLOSURE WITH A NEW ENCLOSURE EQUAL IN LIKENESS. CONTRACTOR TO REMOVE AND PROPERLY DISPOSE OF EXISTING PUMP ENCLOSURE.
15. CONTRACTOR TO COORDINATE SCHEDULE AND REMOVAL OF EXISTING FENCE WITH PROPERTY OWNER PRIOR TO COMPLETING FENCE REMOVAL ACTIVITIES. FOLLOWING COMPLETION OF WELL INSTALLATION ACTIVITIES, THE CONTRACTOR SHALL INSTALL A NEW PERMANENT FENCE OF EQUAL LIKENESS TO REPLACE THE REMOVED FENCE.
16. DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT.

PWC PROJ #BS-15614

FAYETTEVILLE PUBLIC WORKS COMMISSION
WATER RESOURCES ENGINEERING
P.O. Box 1089, Fayetteville, NC 28302
955 Old Wilmington Road, Fayetteville, NC 28301

SURVEY/GPS BY: MCKIM & CREED
LAYOUT BY: LJG DATE: 10/4/22
PLAN/PROF. BY: LJG
DESIGN REVIEW BY: W/R ENGR. DEPT.
APPROVED BY: AMH
SCALE: HOR: 1"= 40'

DATE	REVISIONS	BY

SHT: 13 OF 13 | 20200629.00.RA

z:\Projects\fayetteville public works commission\2020062900ra – big rockfish creek outfall add'l svcesb\CADD\Plan Set\20200629000RA_WELLS_EAST.dwg 10/11/2022 5:41:03 PM

Appendix F
Well Abandonments/Relocations Approvals

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1066			Date:	8/11/2020
PIN:	9493-69-2951				
Address	2507 LAKEVIEW DR	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	BILL'S WELL DRILLING CO	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: Celestine Faircloth *Date:* 8-12-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

Cumberland County Department of Public Health
Environmental Health Division

N
W E
S

60 30 0 60 Feet

COUNTY OF CUMBERLAND
FOUNDED 1754
NORTH CAROLINA

Well Permit Decision Tool

How to U

Screening

Report

Back

Area : 3,134,508.63 ft²

Known Releases of Contamination (0)

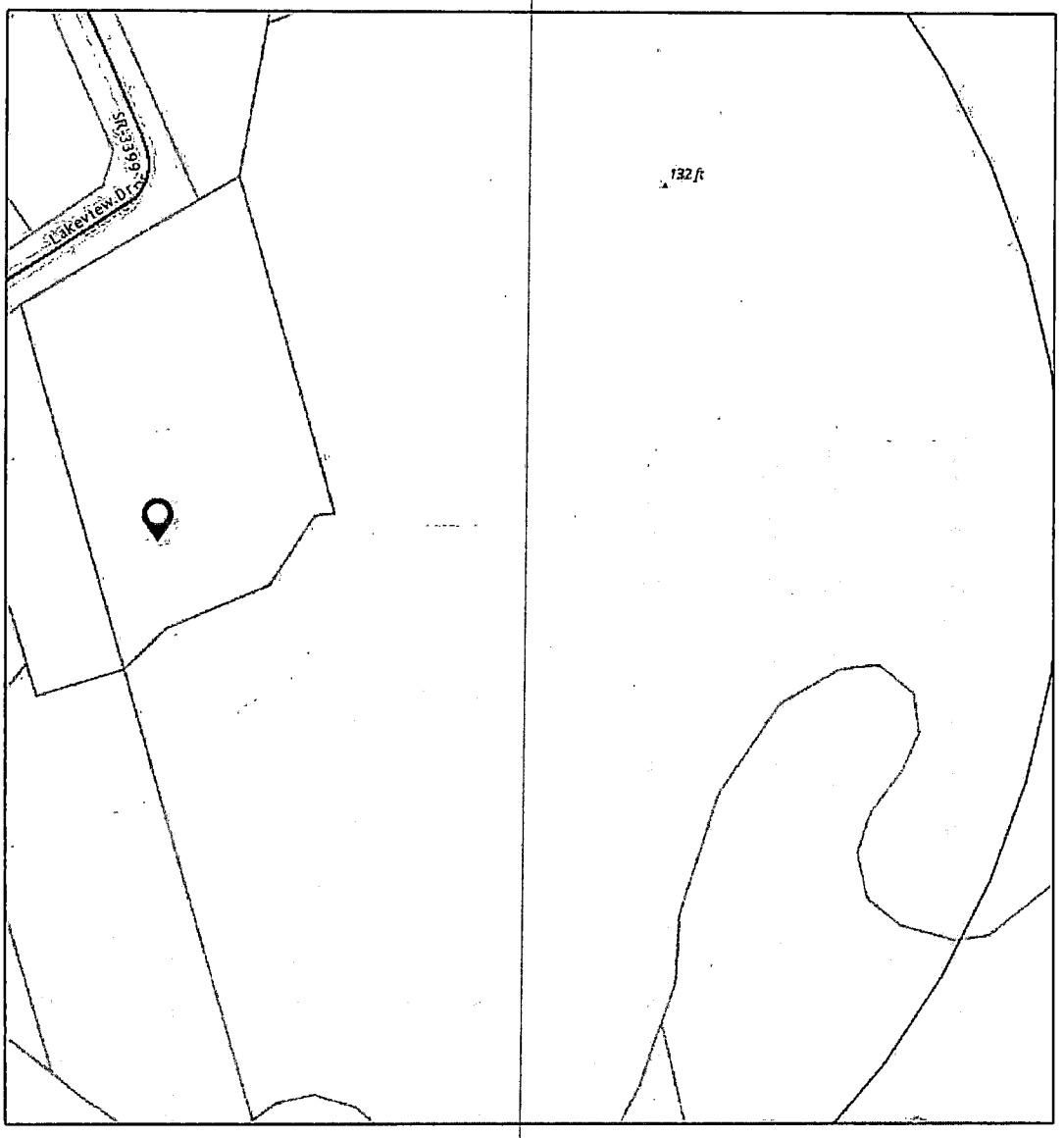
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.63 ft²

Aug 12 2020 9:13:52 Eastern Daylight Time



1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

Parcels (Polygons) - Parcels

Non-System Roads

Federal Route

Non-System

Other System Roads

Ramps, Rest Areas, Non-Mainline

Projected Route

Other State Agency Route

Secondary Route

Primary Roads

Interstate

US Route

2507 Lakeview Dr

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
November 3, 2020

Deborah Williford
2545 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1112
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2545 Lakeview Dr., Fayetteville, NC 28306

Dear Ms. Williford:

On November 3, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2545 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1354			Date:	10/27/2020
PIN:	9493-59-8773				
Address	2545 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	27	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: Celeste Rainey Date: 11-3-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

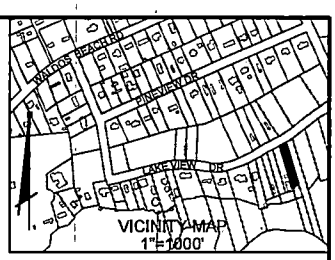
Other Information:

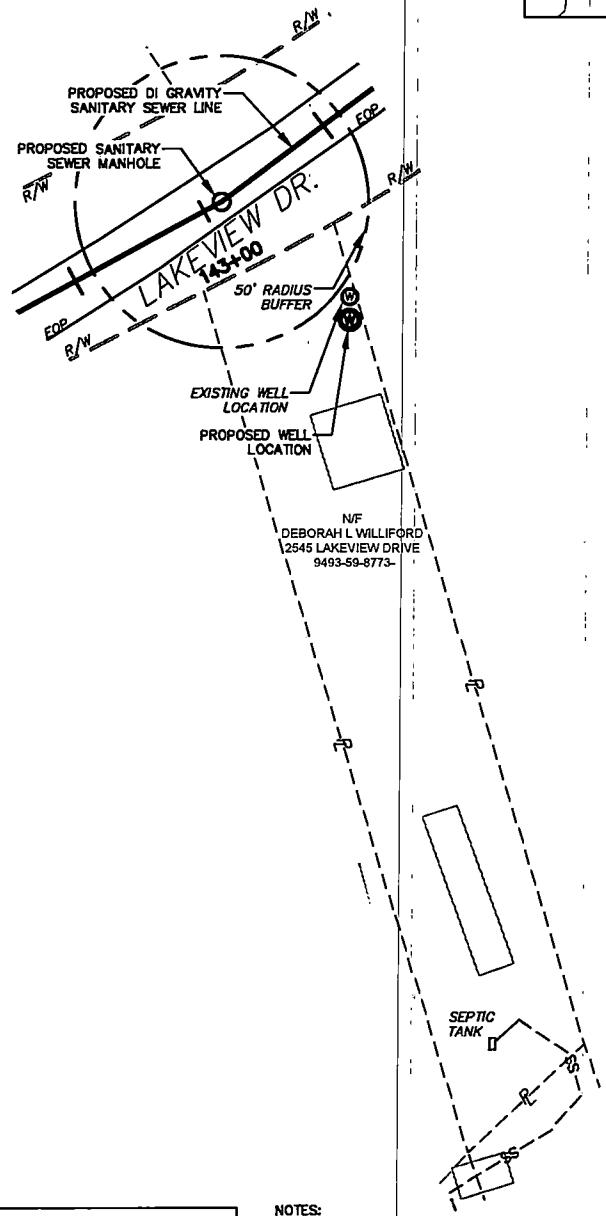
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
DEBORAH L WILLIFORD
PIN# 9493-59-8773

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED GRAVITY SANITARY SEWER
- P — PROPERTY LINE
- SS — SANITARY SEWER DRAIN LINES
- MH MANHOLE
- EOP EDGE OF PAVEMENT
- R/W RIGHT-OF-WAY

SCALE: 1" =50'

0 25 50 100 150

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL—CONTRACT 2 DWI PROJECT NO. CS370434—15/16.
5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING, PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:	DATE	REVISIONS	BY
LAYOUT BY: DATE: 10/09/20			
PLAN/PROF. BY: DWH			
DESIGN REVIEW BY: W/R ENGR. DEPT			
APPROVED BY:			
SCALE: HOR: 1"=50' VERT: 1"=	SHT: 9 OF 10		

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

VARIANCE APPLICATION FOR 2C .0100 WELL CONSTRUCTION STANDARDS:

PRIVATE DRINKING WATER WELLS UNDER 15A NCAC 02C .0300

WATER SUPPLY WELLS UNDER 15A NCAC 02C .0107
All water supply wells not considered "Private Drinking Water Wells" and including irrigation, industrial, and commercial wells.

WELLS OTHER THAN WATER SUPPLY UNDER 15A NCAC 02C .0108
Including monitoring and recovery wells.

Print clearly or type information. Illegible submittals will be returned as incomplete.

DATE: November 3, 2020 **PERMIT NO.:** 2020-1354 (to be completed by DWQ/DPH)

A. WELL OWNER – For single family residences list the property owner(s). For all others, list name of the business, organization, or government agency and person delegated signature authority:

Deborah Williford

Mailing Address: 2545 La Kevien Dr
City: Fayetteville State: NC Zip Code: 28306 County: Cumberland
Day Tele No.: 9106894089 Cell No.:
EMAIL Address: Fax No.:

B. PHYSICAL LOCATION OF WELL SITE

(1) Parcel Identification Number (PIN) of well site: 9493-59-8773
County: Cumberland

(2) Physical Address (if different than mailing address):

City: State: NC Zip Code:

C. WELL DRILLER INFORMATION (if known)

Well Drilling Contractor's Name: Jonathan Kamionka
NC Well Drilling Contractor Certification No.: 3465-A
Company Name: Bill's Well Drilling Co Contact Person:
City: Fayetteville State: NC Zip Code: 28311 County: Cumberland
Day Tele No.: 9104883740 Cell No.: 9108508754
EMAIL Address: office@billswelldrilling.com Fax No.:

D. **REASON FOR VARIANCE REQUEST** – Include type of well(s) to be constructed; rule for which the variance is being requested; description of how the alternate construction will not endanger human health and welfare and the environment; and reason why construction and/or operation in accordance with the standards is not technically feasible and/or provides equal or better protection of the groundwater.

New Rockwell will be less than 100' from manhole

E. **ATTACHMENTS** – Provide the following information as attachments to this application:

(1) A map showing general location of the property (including road names, NC State Route Number, distances, any key landmarks, etc.) sufficient for finding the well location.
(2) Detailed site map with scale showing location of proposed well relevant to septic system(s), building foundations, property lines, water bodies, potential sources of contamination, other wells, etc.
(3) Submit a copy of the local well permit application and site evaluation map (if applicable).
(4) Any other information relevant to the variance request such as a well construction diagram showing proposed well liner or atypical construction materials/methods.

F. **OTHER MINIMUM CONSTRUCTION REQUIREMENTS**

For water supply wells, approval of a variance will require that additional construction requirements beyond those specified in 15A NCAC 02C .0107 be met. Minimum additional construction requirements for Coastal Plain and Piedmont and Mountain region wells are referenced on Attachments A and B on pages 4 and 5 of this application. Approval of a variance will not be considered in cases where the specified minimum additional construction requirements cannot be met.

G. **SIGNATURES**

Jonathan Kaminka
Signature of Person Responsible for Well Construction (typically the well driller)

Jonathan Kaminka
Print or Type Full Name of Person Responsible for Well Construction (typically the well driller)

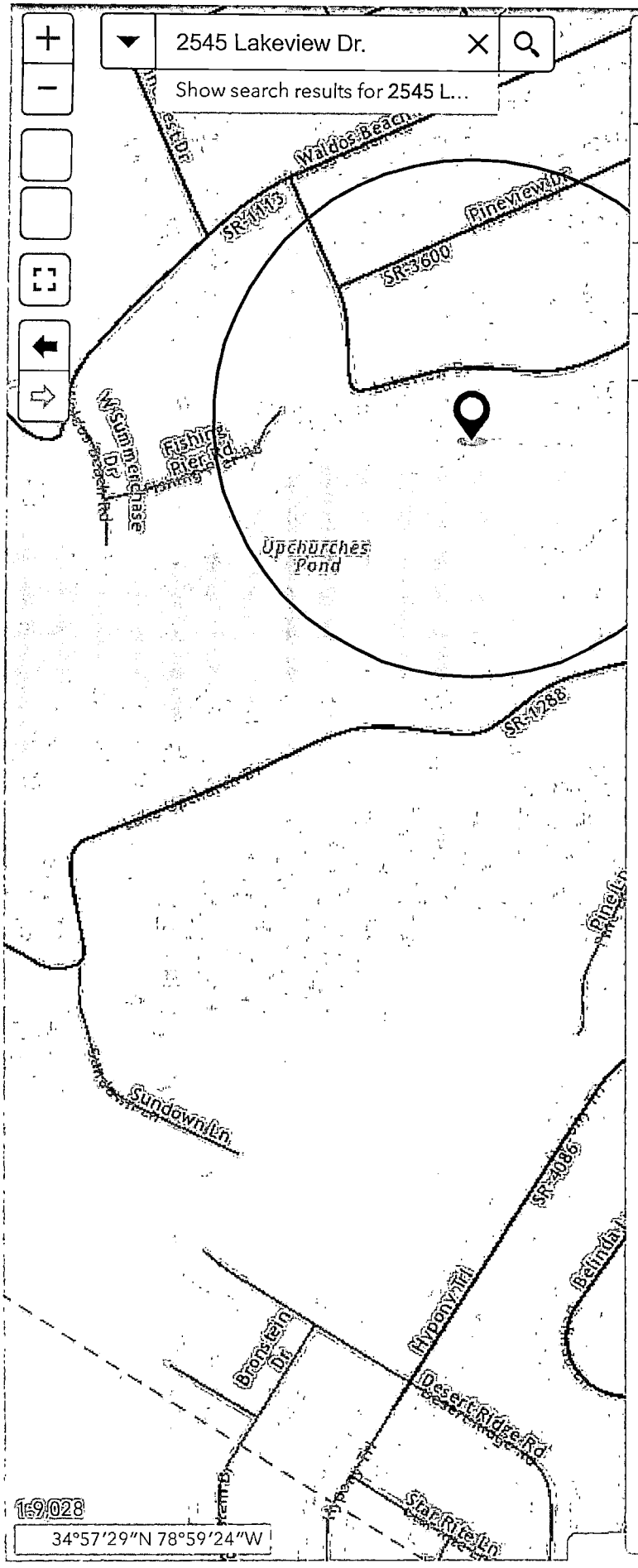
Celestine Rainey-Smith
Signature of County Environmental Health Specialist

Celestine Rainey-Smith
Print or Type Full Name of County Environmental Health Specialist

Per 15A NCAC 02C .0118 the Secretary of the Division of Water Quality or the Division of Public Health may require submittal of information deemed necessary to make a decision on the variance, may impose conditions as part of the decision, and shall respond in writing to the request within 30 days of receipt of the variance request. A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition as described in G.S. 150B-23 within 60 days after receipt of the decision.

Well Permit Decision Tool

How to U



Screening

Report

Back

Area : 3,134,508.61 ft²

Known Releases of Contamination (0)

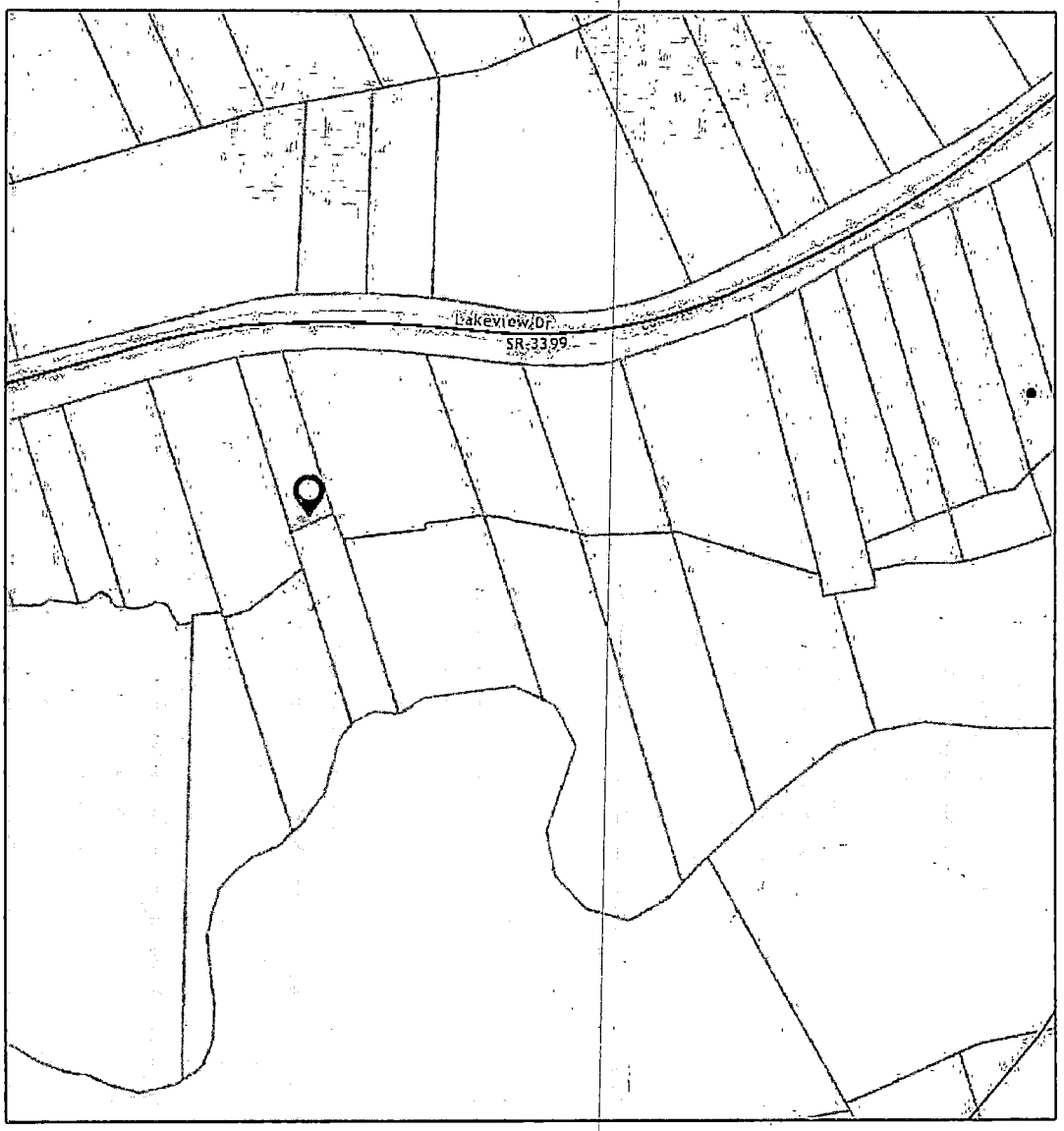
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 29 2020 8:06:40 Eastern Daylight Time



Parcels (Polygons) - Parcels
Non-System Roads
Federal Route
Non-System
Other System Roads
Ramps, Rest Areas, Non-Mainline
Projected Route
Other State Agency Route
Secondary Route
Primary Roads
Interstate
US Route

1:2,257
0 0.01 0.03 0.06 mi
0 0.03 0.05 0.1 km

TCDOT GIS Unit, Source: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Esri Community Maps Contributors, County of Cumberland, State of North

2545 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
November 3, 2020

Deborah Williford
2545 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1112
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2545 Lakeview Dr., Fayetteville, NC 28306

Dear Ms. Williford:

On November 3, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C: 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2545 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1504			Date:	12/11/2020
PIN:	9493-59-8639				
Address	2551 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	BILL'S WELL DRILLING	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: F. Ne *Date:* 12-11-20

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

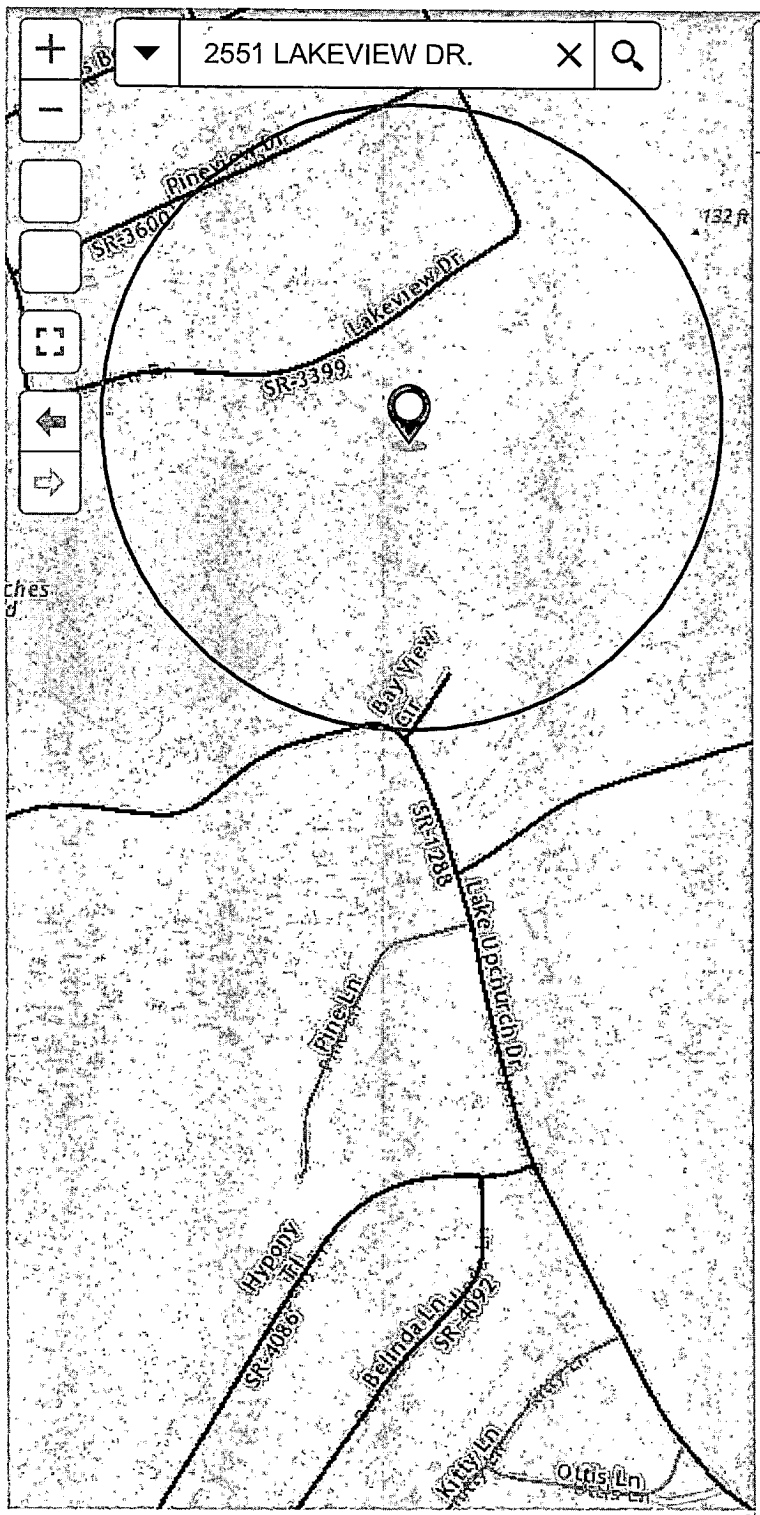
Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

Well Permit Decision Tool

How to U



Screening

AOI

Place name	Draw

Search for a location

2551 LAKEVIEW DRIVE, FAYE

Buffer distance (optional)

Show results within

1,000	Feet

Report Start Over

1:9,028

34°57'23"N 79°00'16"W

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.7 ft²

Dec 11 2020 15:33:35 Eastern Standard Time

Parcels (Polygons) - Parcels

Non-System Roads

Federal Route

Non-System

Other System Roads

Ramps, Rest Areas, Non-Mainline

Projected Route

Other State Agency Route

Secondary Route

Primary Roads

Interstate

US Route

1:4,514

0 0.03 0.06 0.12 mi

0 0.05 0.1 0.2 km

2551 LAKEVIEW DRIVE

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 28, 2020

Samuel Huggins
2561 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1106
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2561 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Huggins:

On October 28, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1356			*Date:*	10/27/2020
PIN:	9493-59-7644				
Address	2561 LAKEVIEW DRIVE	*City*	Fayetteville	*Zip*	28306-
Subdivision:		*Lot(s)*	24	*Section*	
Applicant:	BILL'S WELL DRILLING CO.	*Applicant Type*	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	*City*	Fayetteville	*Zip*	28311-

Permit To Construct

Permit Issued By: Celeste Lewis *Date:* 10-28-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

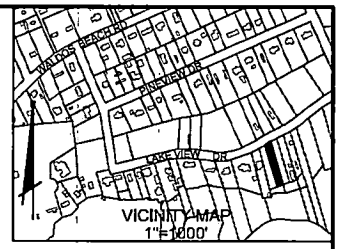
Other Information:

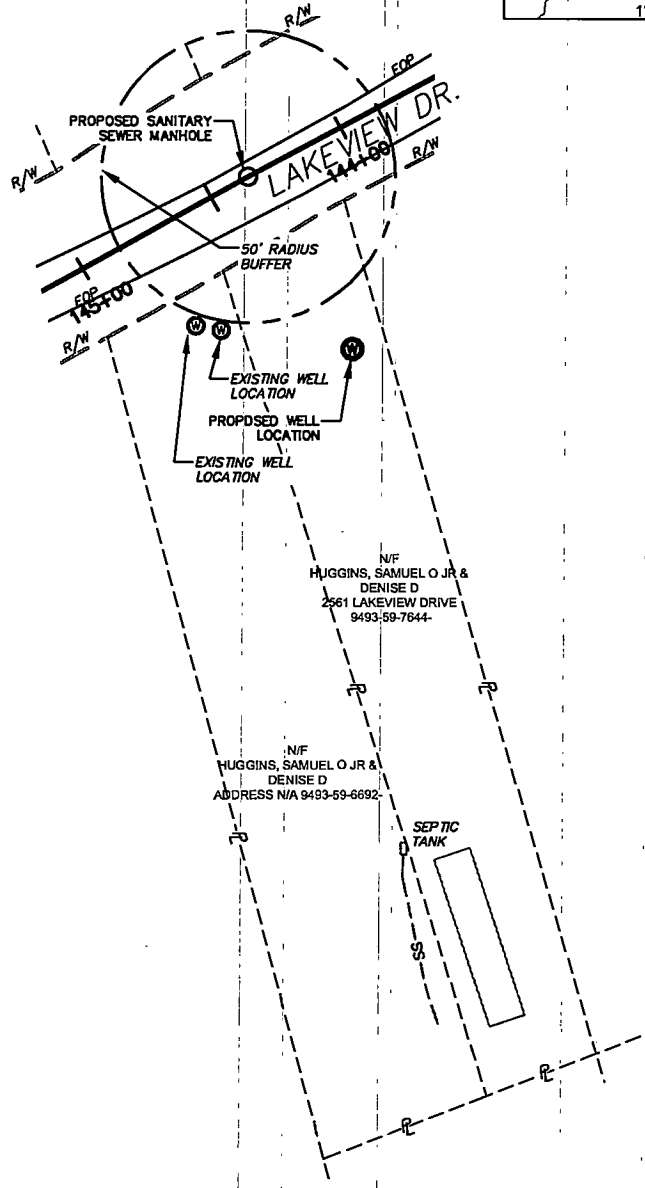
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
SAMUEL O JR & DENISE D HUGGINS
PIN# 9493-59-7644

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED GRAVITY SANITARY SEWER
- PROPERTY LINE
- SS SANITARY SEWER DRAIN LINES
- MH MANHOLE
- EOP EDGE OF PAVEMENT
- R/W RIGHT-OF-WAY

SCALE: 1" =50'

0 25 50 100 150

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPRDVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC.. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED 'SANITARY SEWER IMPRDVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16.
4. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
5. PROPDSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

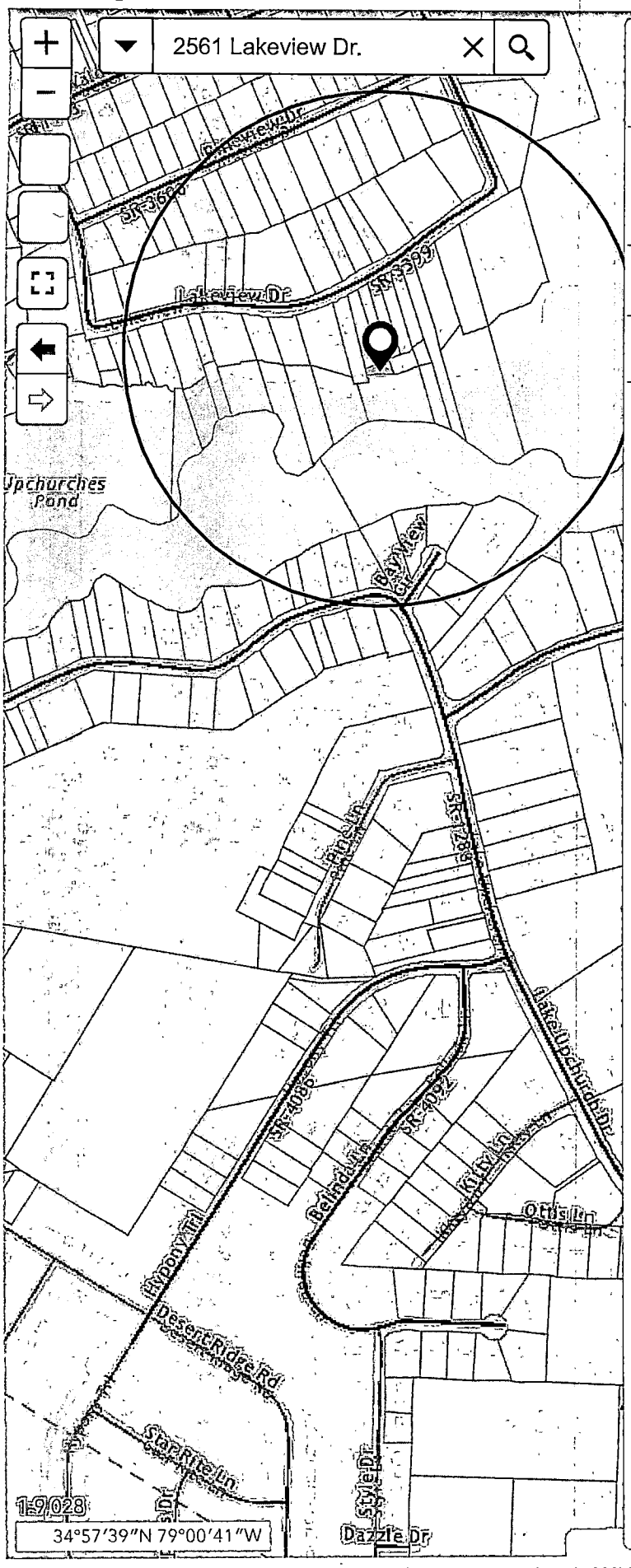
SURVEY/GPS BY:	
LAYOUT BY:	DATE: 10/09/20
PLAN/PROF. BY:	DWH
DESIGN REVIEW BY:	W/R ENGR. DEPT.
APPROVED BY:	
SCALE: HOR:	1"=50' VERT: 1"=

DATE	REVISIONS	BY

SHT: 11 OF 10

Well Permit Decision Tool

How to U



Screening

Report

Back — Area : 3,134,508.67 ft²

Known Releases of Contamination (0)

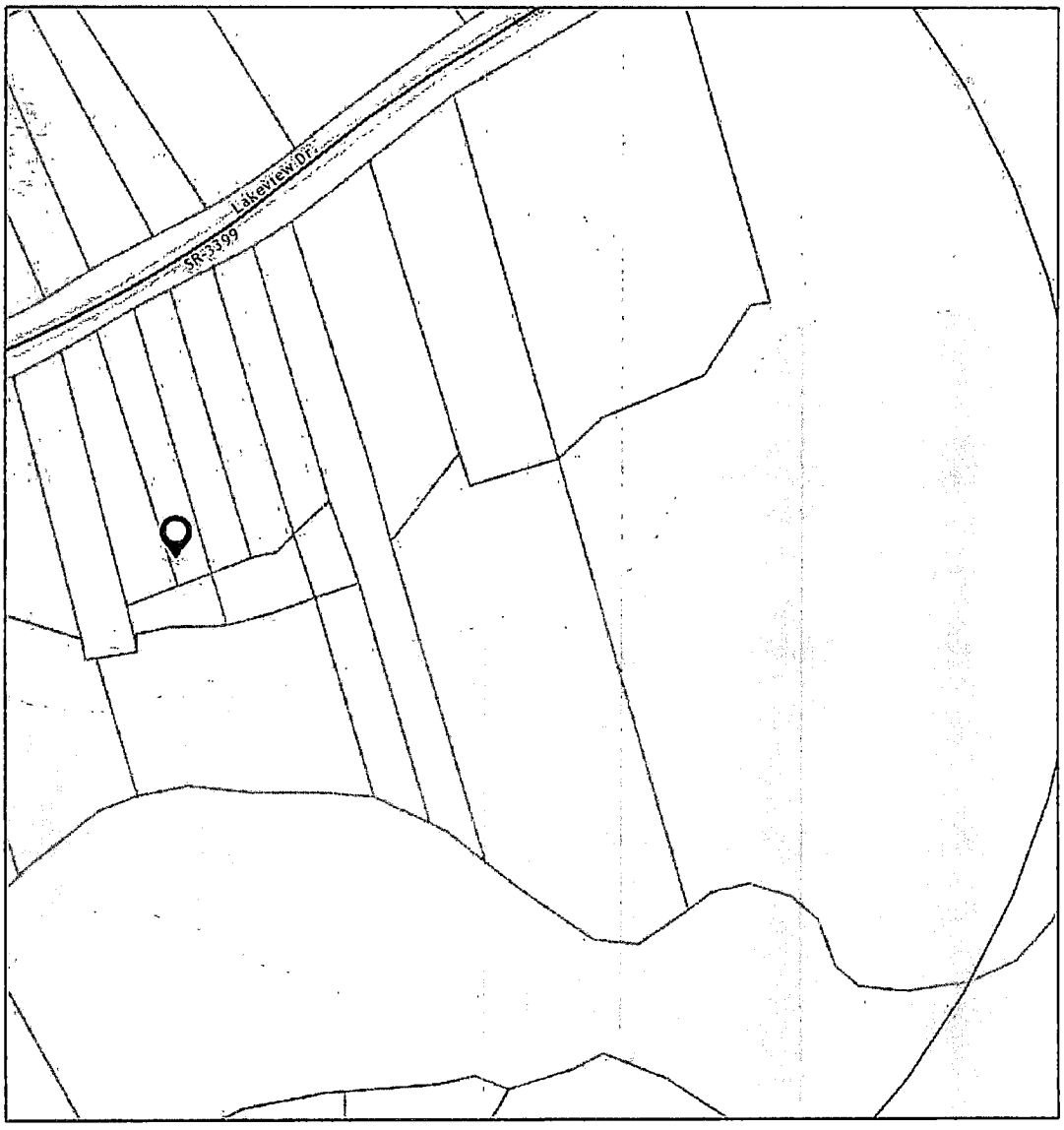
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.67 ft²

Oct 28 2020 8:46:22 Eastern Daylight Time



Parcels (Polygons) - Parcels

Non-System Roads

Federal Route

Non-System

Other System Roads

Ramps, Rest Areas, Non-Mainline

Projected Route

Other State Agency Route

Secondary Route

Primary Roads

Interstate

US Route

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

2561 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 29, 2020

Catherine Phipps
PO Box 41652
Fayetteville, NC 28309

RE: Approval No. WWM1108
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2563 Lakeview Dr., Fayetteville, NC 28306

Dear Ms. Phipps:

On October 29, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2563 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 28, 2020

Helga Niedenthal
2633 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1107
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2564 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Huggins:

On October 28, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020 1355				Date:	10/27/2020
PIN:	9493-59-5997				
Address	2564 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	58	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: Celestine Ramos Date: 10-28-2020

See Attached Site Plan

Well Grout

Driller: Date:

Grout Depth 0 Ft Type Of Well:

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668****

Well Grout Approved By: Date:

FINAL WELL APPROVAL

Final Well Approved By: Date:

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

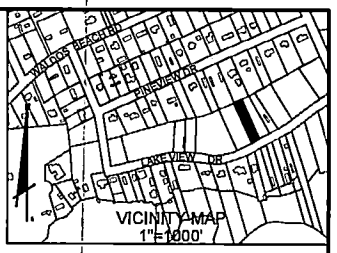
Other Information:

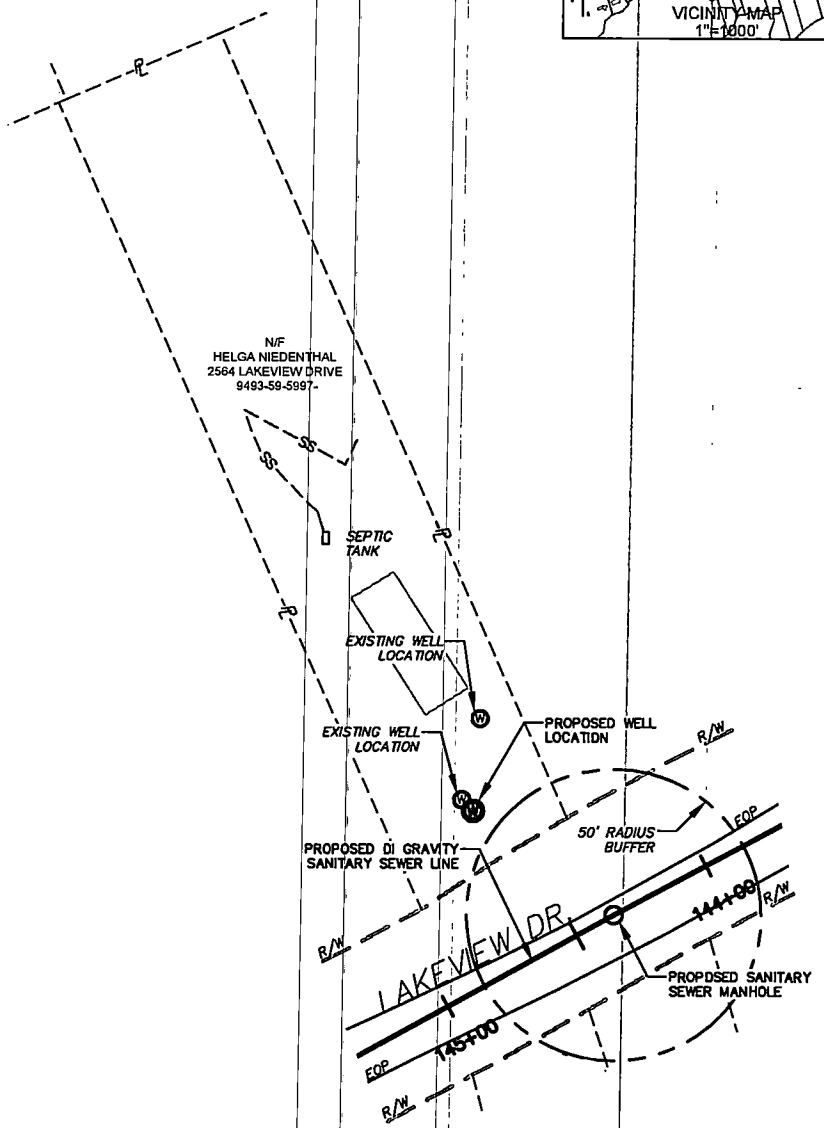
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
HELGA NIEDENTHAL
PIN# 9493-59-5997

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——R———	PROPERTY LINE
——SS———	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" =50'

0 25 50 100 150

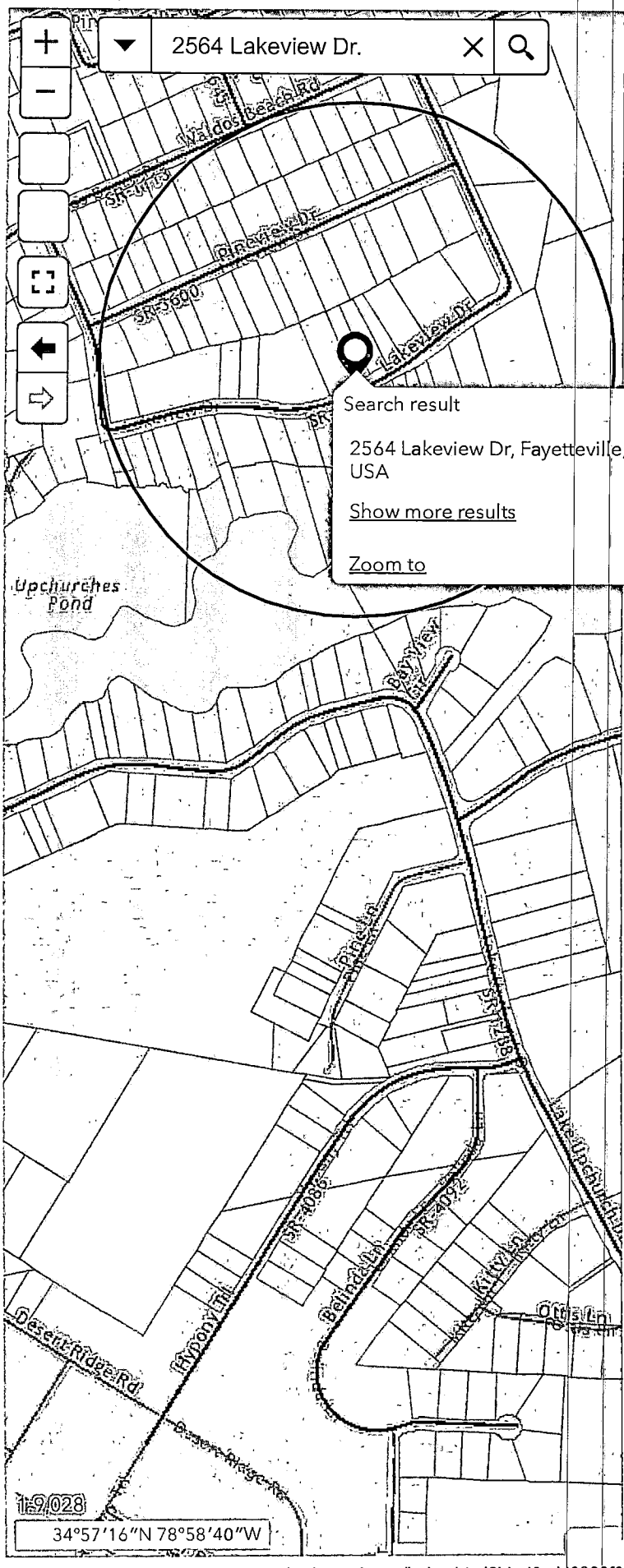
NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPRDVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT N.D. CS370434-15/16.
5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPDSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

		DATE	REVISIONS	BY
SURVEY/GPS BY:				
LAYOUT BY:	DATE: 10/09/20			
PLAN/PROF. BY:	DWH			
DESIGN REVIEW BY:	W/R ENGR. DEPT			
APPROVED BY:				
SCALE: HOR: 1"=50'	VERT: 1"=	SHT: 10 OF 10		

Well Permit Decision Tool

How to U



Screening

Report

Back

Area : 3,134,508.61 ft²

Known Releases of Contamination (0)

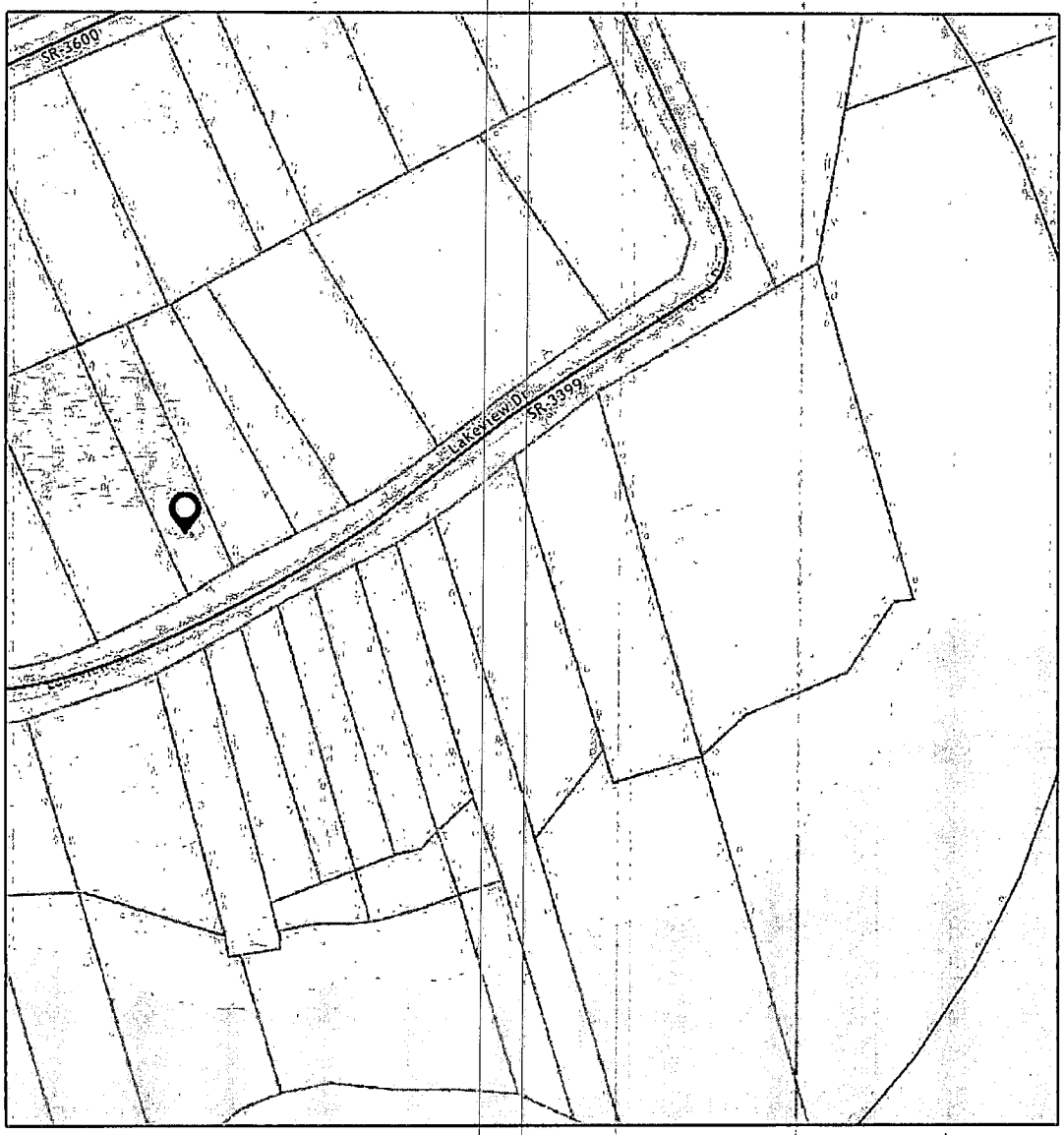
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 28 2020 8:49:12 Eastern Daylight Time



Parcels (Polygons) - Parcels
Non-System Roads
Federal Route
Non-System
Other System Roads
Ramps, Rest Areas, Non-Mainline
Projected Route
Other State Agency Route
Secondary Route
Primary Roads
Interstate
US Route

1:2,257
0 0.01 0.03 0.06 mi
0 0.03 0.05 0.1 km

NCDOT GIS Unit, Source: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA Intermap and the GIS user community, Esri Community Maps Contributors, County of Cumberland, State of North

2564 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
November 18, 2020

Samuel Huggins
5539 Heather St.
Hope Mills, NC 28348

RE: Approval No. WWM1123
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2571 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Huggins:

On November 18, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1352			Date:	10/27/2020
PIN:	9493-59-6558				
Address	2571 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	22	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHRUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] *Date:* 11-17-20

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

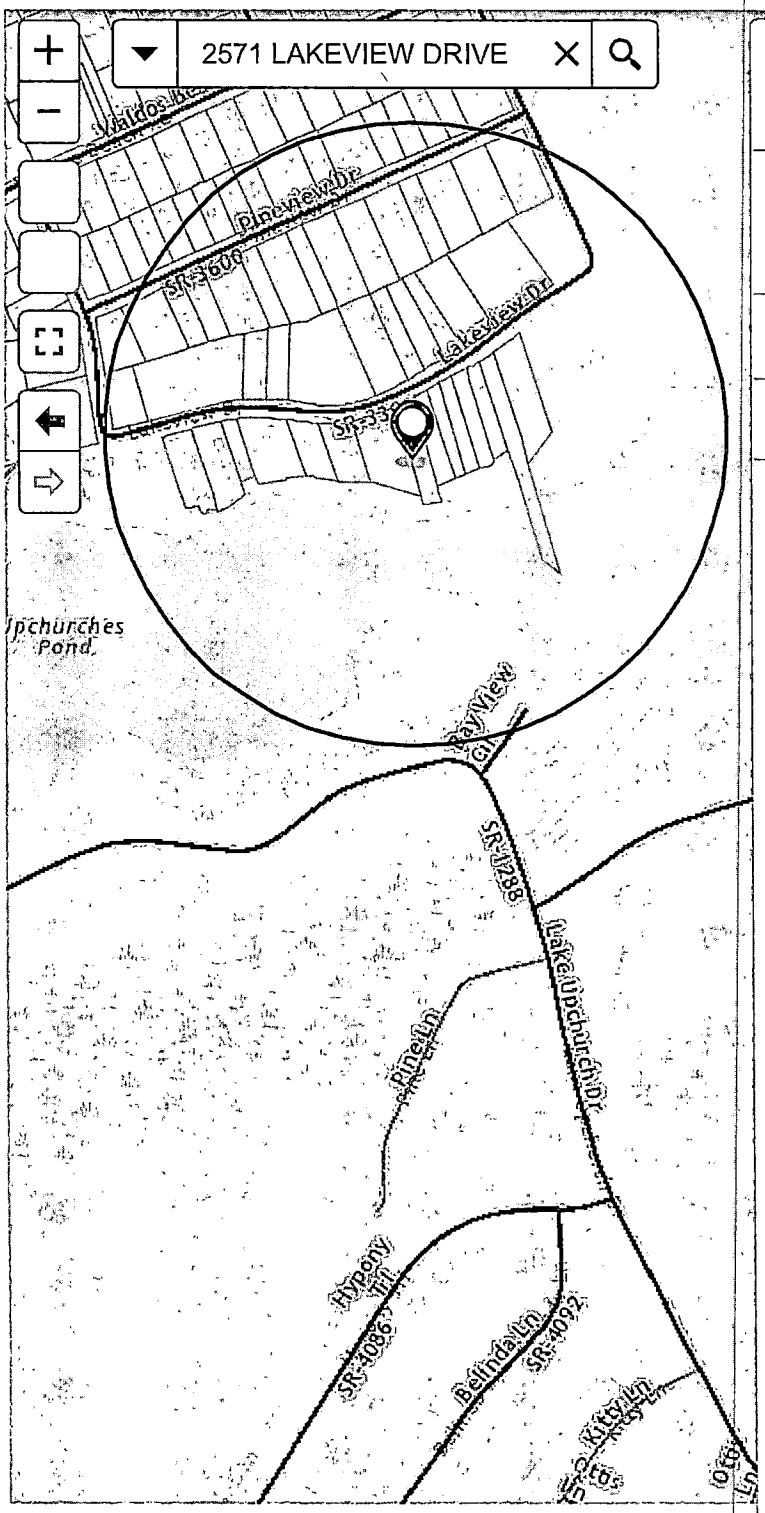
Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

Well Permit Decision Tool

How to U



Screening

Report

Back Area : 3,134,508.67 ft²

Known Releases of Contamination (0)

No results found

Upload shapefile to include in analysis Upload

1:9,028

34°57'28"N 79°00'06"W

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.67 ft²

Nov 17 2020 12:08:04 Eastern Standard Time

2571 LAKEVIEW DRIVE

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

VARIANCE APPLICATION FOR 2C .0100 WELL CONSTRUCTION STANDARDS:

PRIVATE DRINKING WATER WELLS UNDER 15A NCAC 02C .0300

WATER SUPPLY WELLS UNDER 15A NCAC 02C .0107
All water supply wells not considered "Private Drinking Water Wells" and including irrigation, industrial, and commercial wells.

WELLS OTHER THAN WATER SUPPLY UNDER 15A NCAC 02C .0108
Including monitoring and recovery wells.

Print clearly or type information. Illegible submittals will be returned as incomplete.

DATE: _____, 20____ **PERMIT NO.:** _____ (to be completed by DWQ/DPH)

A. **WELL OWNER** – For single family residences list the property owner(s). For all others, list name of the business, organization, or government agency and person delegated signature authority:

Samuel Huggins

Mailing Address: 5539 Heather St

City: Hope Mills State: NC Zip Code: 28348 County: _____

Day Tele No.: 424-8890 Cell No.: _____

EMAIL Address: _____ Fax No.: _____

B. **PHYSICAL LOCATION OF WELL SITE**

(1) Parcel Identification Number (PIN) of well site: 9493-59-6558

County: Cumberland

(2) Physical Address (if different than mailing address): 2571 Lakeview Dr

City: Fayetteville State: NC Zip Code: 28306

C. **WELL DRILLER INFORMATION** (if known)

Well Drilling Contractor's Name: Jonathan Kamionka

NC Well Drilling Contractor Certification No.: 3465-A

Company Name: Bill's Well Drilling Co Contact Person: _____

City: Fayetteville State: NC Zip Code: 28311 County: Cumberland

Day Tele No.: 9104883740 Cell No.: 9108508754

EMAIL Address: office@billswelldrilling.com Fax No.: _____

D. REASON FOR VARIANCE REQUEST – Include type of well(s) to be constructed; rule for which the variance is being requested; description of how the alternate construction will not endanger human health and welfare and the environment; and reason why construction and/or operation in accordance with the standards is not technically feasible and/or provides equal or better protection of the groundwater.

New Rockwell will be less than 100' from manhole

E. ATTACHMENTS – Provide the following information as attachments to this application:

(1) A map showing general location of the property (including road names, NC State Route Number, distances, any key landmarks, etc.) sufficient for finding the well location.
(2) Detailed site map with scale showing location of proposed well relevant to septic system(s), building foundations, property lines, water bodies, potential sources of contamination, other wells, etc.
(3) Submit a copy of the local well permit application and site evaluation map (if applicable).
(4) Any other information relevant to the variance request such as a well construction diagram showing proposed well liner or atypical construction materials/methods.

F. OTHER MINIMUM CONSTRUCTION REQUIREMENTS

For water supply wells, approval of a variance will require that additional construction requirements beyond those specified in 15A NCAC 02C .0107 be met. Minimum additional construction requirements for Coastal Plain and Piedmont and Mountain region wells are referenced on Attachments A and B on pages 4 and 5 of this application. Approval of a variance will not be considered in cases where the specified minimum additional construction requirements cannot be met.

G. SIGNATURES

Jonathan Kamionka

Signature of Person Responsible for Well Construction (typically the well driller)

Jonathan Kamionka

Print or Type Full Name of Person Responsible for Well Construction (typically the well driller)

Signature of County Environmental Health Specialist

Print or Type Full Name of County Environmental Health Specialist

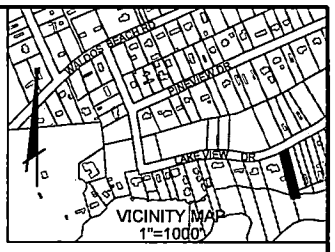
Per 15A NCAC 02C .0118 the Secretary of the Division of Water Quality or the Division of Public Health may require submittal of information deemed necessary to make a decision on the variance, may impose conditions as part of the decision, and shall respond in writing to the request within 30 days of receipt of the variance request. A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition as described in G.S. 150B-23 within 60 days after receipt of the decision.

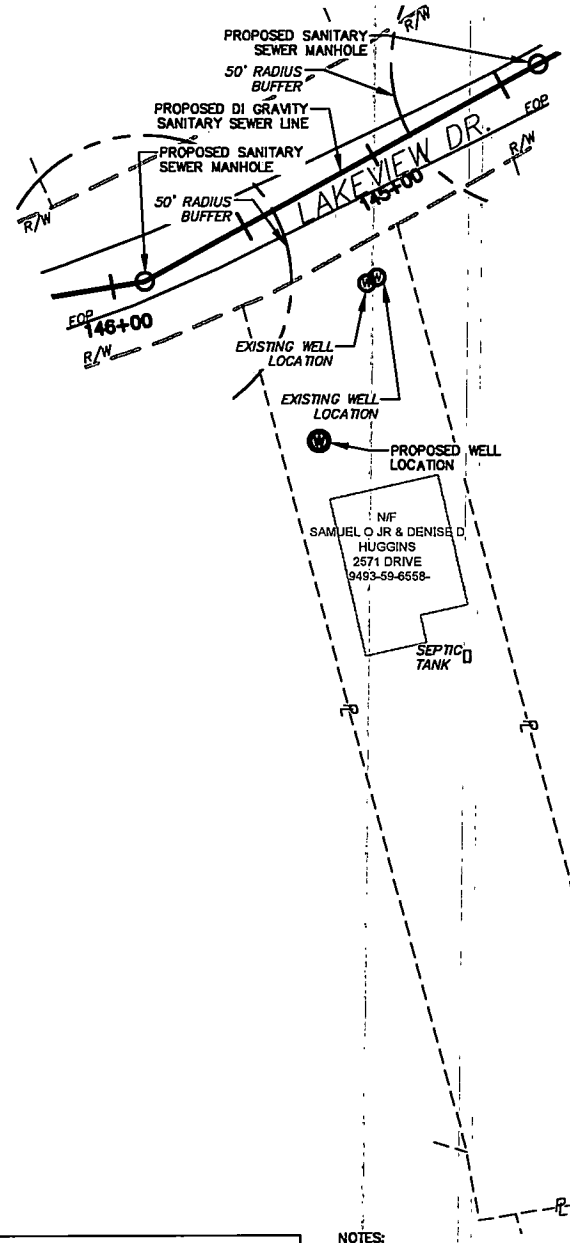
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
SAMUEL O JR & DENISE D HUGGINS
PIN# 9493-59-6558

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——PL——	PROPERTY LINE
——SS——	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" =50'

0 25 50 100 150

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL–CONTRACT 2 DWI PROJECT NO. CS370434–15/16.
5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING, PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:		DATE	REVISIONS	BY
LAYOUT BY:	DATE: 10/09/20			
PLAN/PROF. BY:	DWH			
DESIGN REVIEW BY:	W/R ENGR. DEPT			
APPROVED BY:				
SCALE: HOR: 1"=50'	VERT: 1"=	SHT: 7 OF 10		

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 14, 2020

Ellis Bryant
2583 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1069
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2583 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On August 14, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

4:30 - Thur

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1063			Date:	8/11/2020
PIN:	9493-59-5529				
Address	2583 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] *Date:* 8-13-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

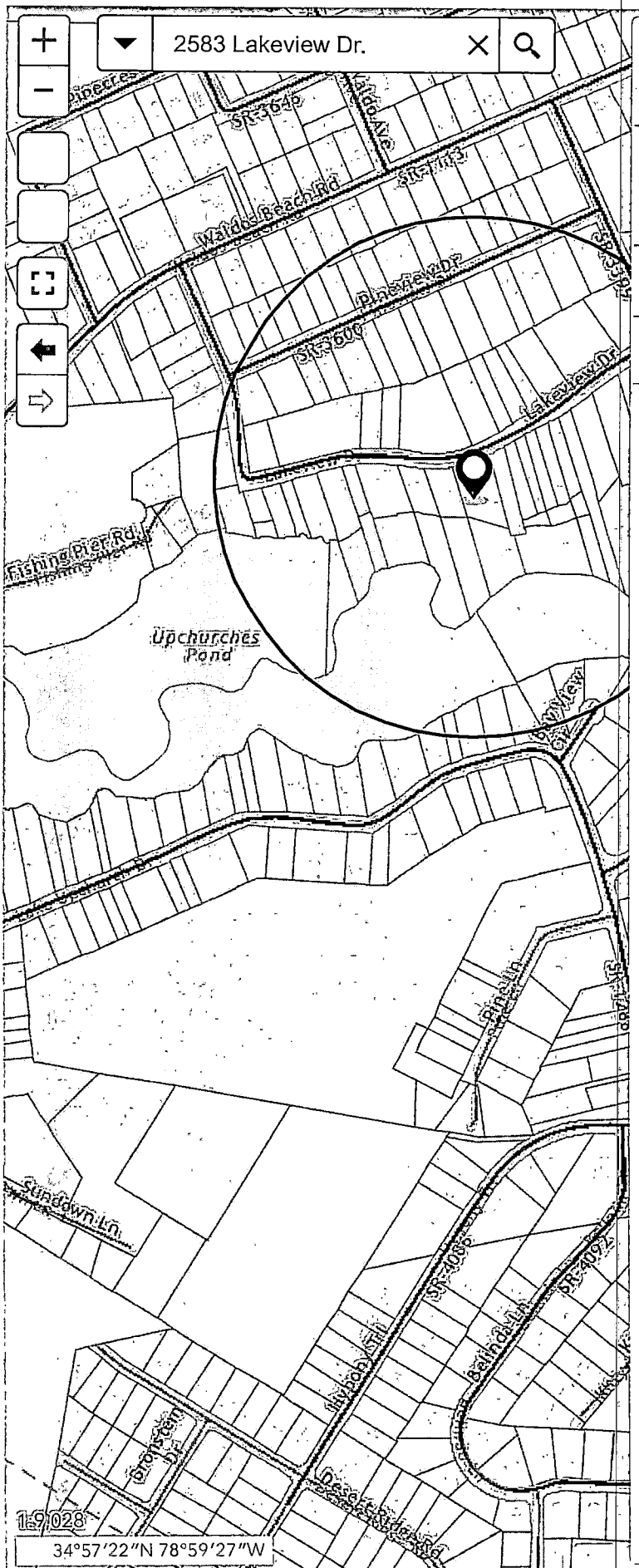
Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

.Well Permit Decision Tool

How to U



Screening

Report

Back

Area : 3,134,508.67 ft²

Known Releases of Contamination (0)

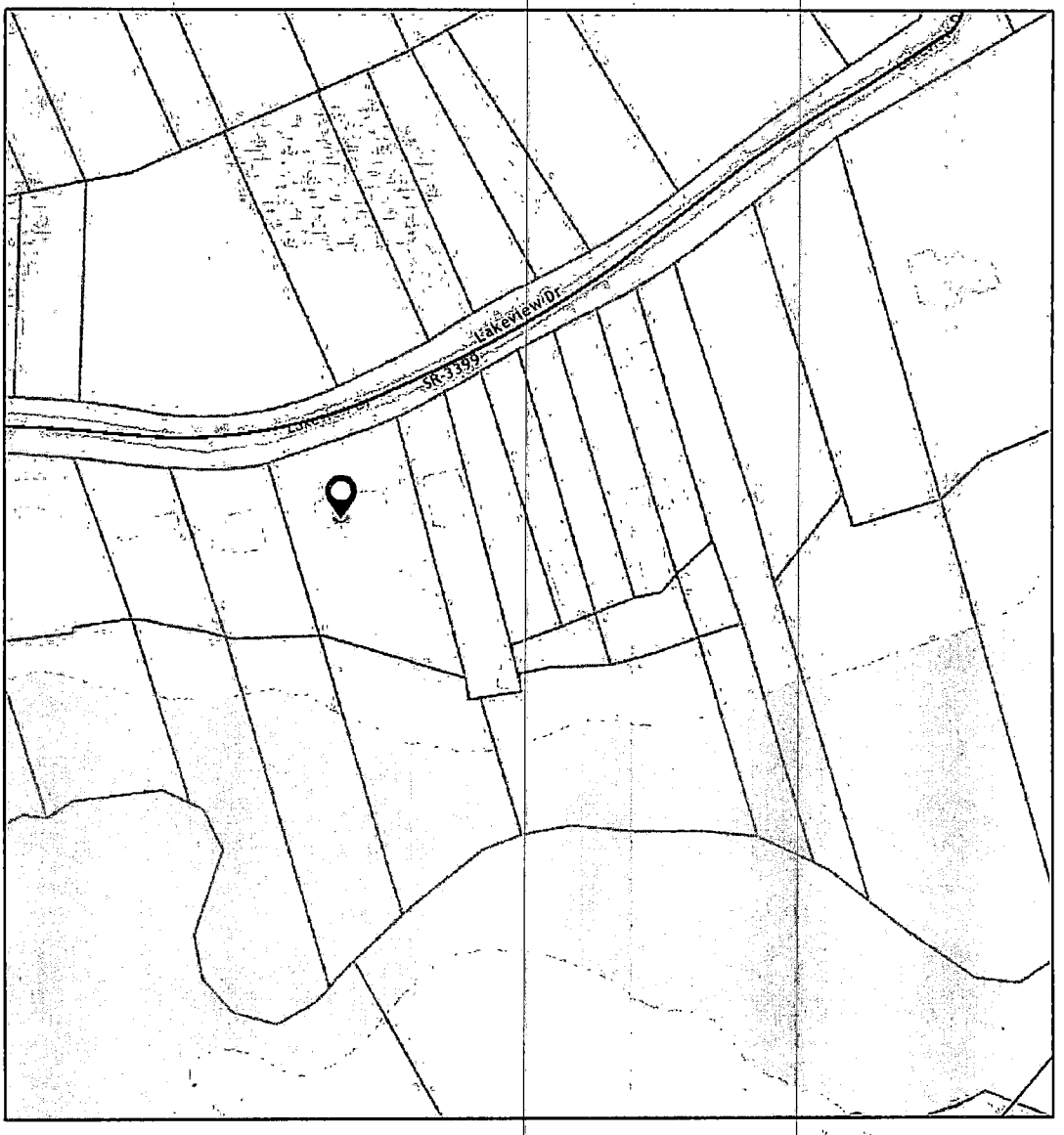
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.67 ft²

Aug 12 2020 9:12:15 Eastern Daylight Time



2583 Lakeview Dr

Cumberland County Department of Public Health
Environmental Health Division

N
W E
S

50 25 0 50 Feet

COUNTY OF CUMBERLAND
NORTH CAROLINA

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 12, 2020

Paulette Munson
2595 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1067
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2595 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On August 12, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a non-water tight sanitary sewer line less than 100' to the water supply well at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) The well shall be sampled for bacteria and inorganic analysis.
2) If sample results indicate contaminants, further repairs and/or treatment may be recommended.
3) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1351			Date:	10/27/2020
PIN:	9493-59-3610				
Address	2603 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	15-16	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] *Date:* 11-4-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

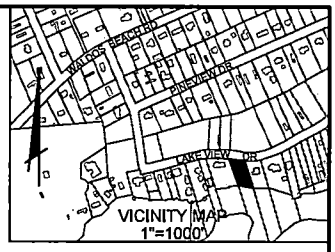
Final Well Approved By: *Date:*

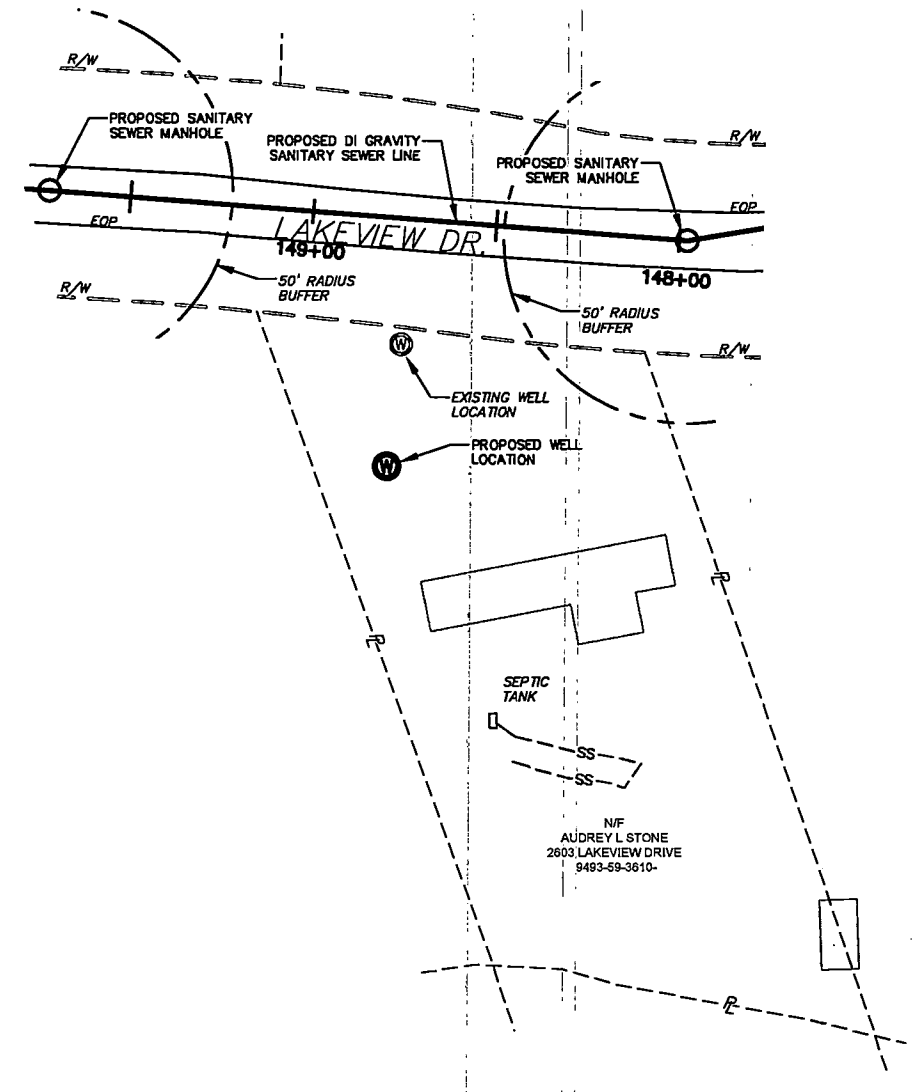
NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
AUDREY L STONE
PIN# 9493-59-3610





LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——P——P——	PROPERTY LINE
——SS——SS——	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" = 40'

0 20 40 80 120

NOTES:
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5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING, PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
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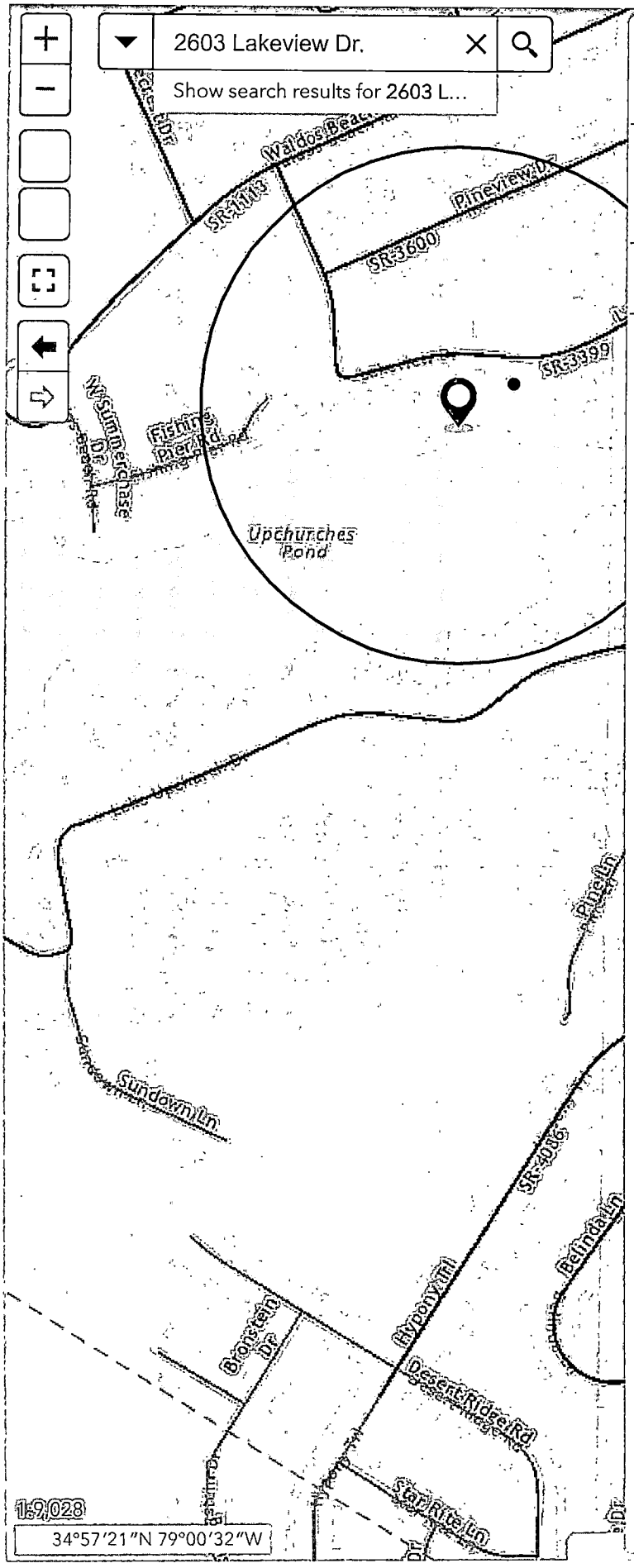
PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:		DATE	REVISIONS	BY
LAYOUT BY:	DATE: 10/09/20			
PLAN/PROF. BY:	DWH			
DESIGN REVIEW BY:	W/R ENGR. DEPT			
APPROVED BY:				
SCALE: HOR: 1"=40'	VERT: 1"=	SHT: 6 OF 10		

Well Permit Decision Tool

How to U



Screening

Report

Back — Area : 3,134,508.61 ft²

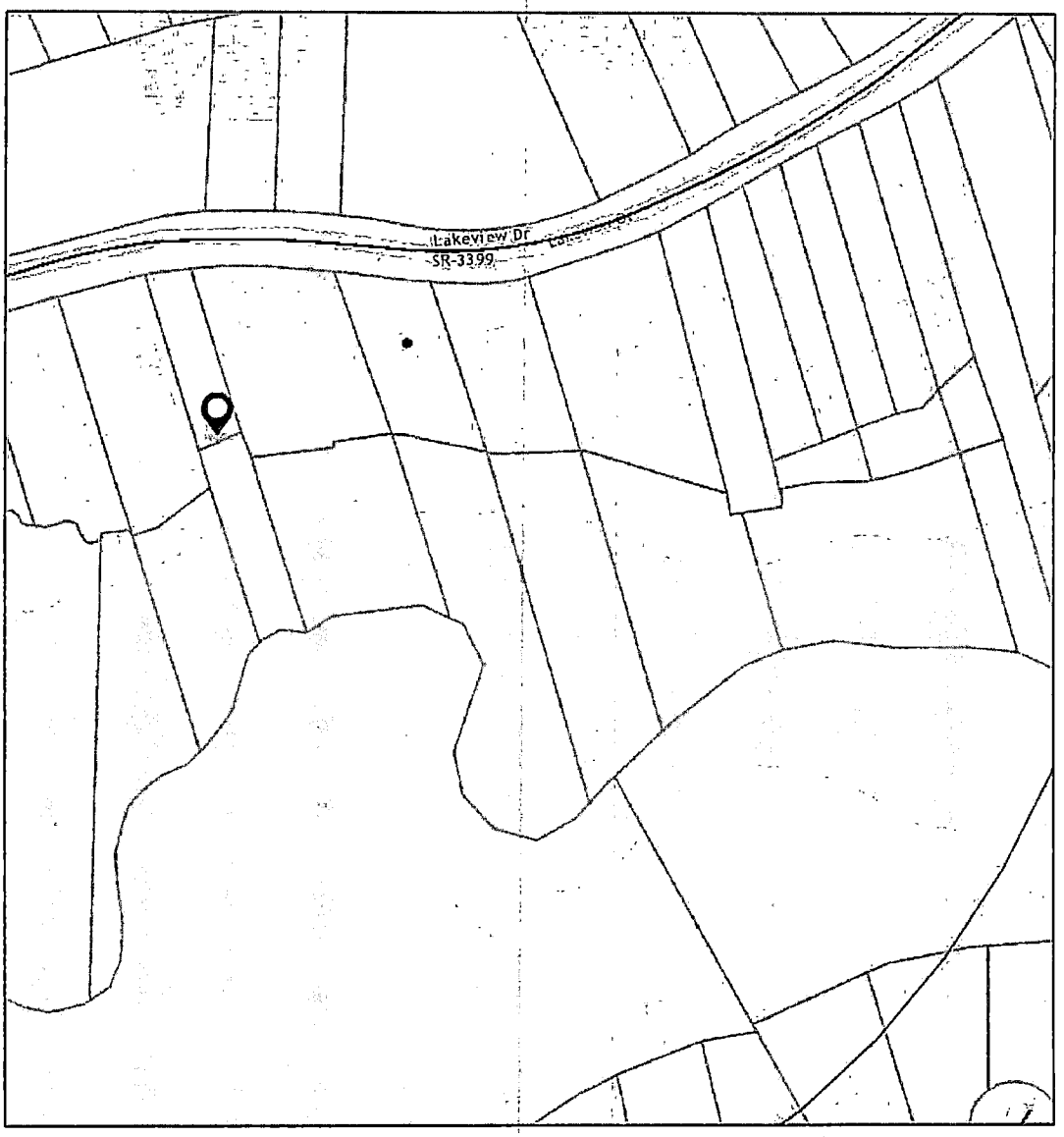
Known Releases of Contamination (0)

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 29 2020 8:04:36 Eastern Daylight Time



2603 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 12, 2020

Ellis Ehle
PO Box 48121
Cumberland, NC 28331

RE: Approval No. WWM1065
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2619 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On August 12, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a non-water tight sanitary sewer line less than 100' to the water supply well at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) The well shall be sampled for bacteria and inorganic analysis.
2) If sample results indicate contaminants, further repairs and/or treatment may be recommended.
3) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
November 3, 2020

William Dean
5733 Rockfish Rd.
Hope Mills, NC 28346

RE: Approval No. WWM1113
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2623 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Dean:

On November 3, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2623 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1347			Date:	10/27/2020
PIN:	9493-49-0589				
Address	2623 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	11	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: Celestine Ravelle *Date:* 11-3-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

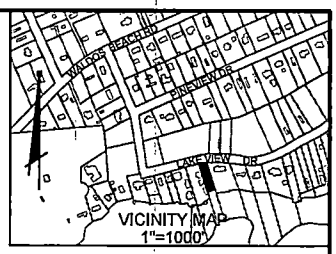
Other Information:

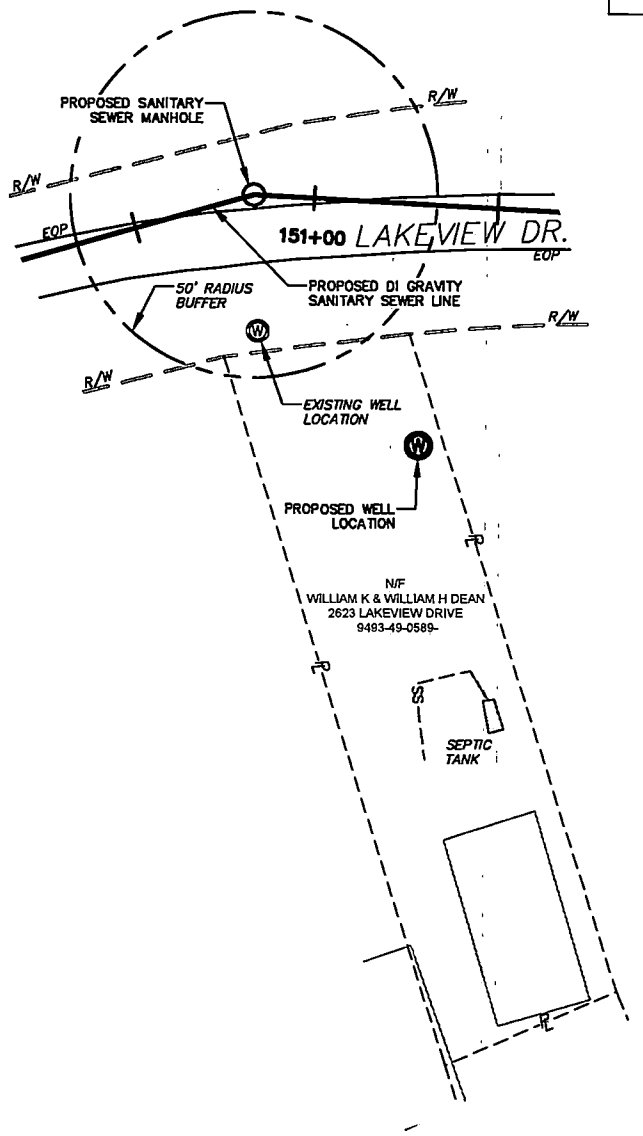
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
WILLIAM K & WILLIAM H DEAN
PIN# 9493-49-0589

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——℄———	PROPERTY LINE
——SS———	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" = 40'

0 20 40 80 120

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
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3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16.
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PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:		DATE	REVISIONS	BY
LAYOUT BY:	DATE: 10/09/20			
PLAN/PROF BY:	DWH			
DESIGN REVIEW BY:	W/R ENGR DEPT			
APPROVED BY:				
SCALE: HOR: 1"=40'	VERT: 1"=	SHT: 5 OF 10		

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

VARIANCE APPLICATION FOR 2C .0100 WELL CONSTRUCTION STANDARDS:

PRIVATE DRINKING WATER WELLS UNDER 15A NCAC 02C .0300

WATER SUPPLY WELLS UNDER 15A NCAC 02C .0107
All water supply wells not considered "Private Drinking Water Wells" and including irrigation, industrial, and commercial wells.

WELLS OTHER THAN WATER SUPPLY UNDER 15A NCAC 02C .0108
Including monitoring and recovery wells.

Print clearly or type information. Illegible submittals will be returned as incomplete.

DATE: November 3, 2020 **PERMIT NO.:** 2020-1347 (to be completed by DWQ/DPH)

A. WELL OWNER – For single family residences list the property owner(s). For all others, list name of the business, organization, or government agency and person delegated signature authority:

William Dean

Mailing Address: 5733 Rockfish Rd

City: Hope Mills State: NC Zip Code: 28348 County: Cumberland

Day Tele No.: 624-8691 Cell No.:

EMAIL Address: Fax No.:

B. PHYSICAL LOCATION OF WELL SITE

(1) Parcel Identification Number (PIN) of well site: 9493-49-0589

County: Cumberland

(2) Physical Address (if different than mailing address): 2623 Lakeview Dr

City: Fayetteville State: NC Zip Code: 28306

C. WELL DRILLER INFORMATION (if known)

Well Drilling Contractor's Name: Jonathan Kamionka

NC Well Drilling Contractor Certification No.: 3465-A

Company Name: Bill's Well Drilling Co Contact Person:

City: Fayetteville State: NC Zip Code: 28311 County: Cumberland

Day Tele No.: 9104883740 Cell No.: 9108508754

EMAIL Address: office@billswelldrilling.com Fax No.:

D. **REASON FOR VARIANCE REQUEST** – Include type of well(s) to be constructed; rule for which the variance is being requested; description of how the alternate construction will not endanger human health and welfare and the environment; and reason why construction and/or operation in accordance with the standards is not technically feasible and/or provides equal or better protection of the groundwater.

New Rockwell will be less than 100' from manhole

E. **ATTACHMENTS** – Provide the following information as attachments to this application:

(1) A map showing general location of the property (including road names, NC State Route Number, distances, any key landmarks, etc.) sufficient for finding the well location.
(2) Detailed site map with scale showing location of proposed well relevant to septic system(s), building foundations, property lines, water bodies, potential sources of contamination, other wells, etc.
(3) Submit a copy of the local well permit application and site evaluation map (if applicable).
(4) Any other information relevant to the variance request such as a well construction diagram showing proposed well liner or atypical construction materials/methods.

F. **OTHER MINIMUM CONSTRUCTION REQUIREMENTS**

For water supply wells, approval of a variance will require that additional construction requirements beyond those specified in 15A NCAC 02C .0107 be met. Minimum additional construction requirements for Coastal Plain and Piedmont and Mountain region wells are referenced on Attachments A and B on pages 4 and 5 of this application. Approval of a variance will not be considered in cases where the specified minimum additional construction requirements cannot be met.

G. **SIGNATURES**

Jonathon Kaminka
Signature of Person Responsible for Well Construction (typically the well driller)

Jonathon Kaminka
Print or Type Full Name of Person Responsible for Well Construction (typically the well driller)

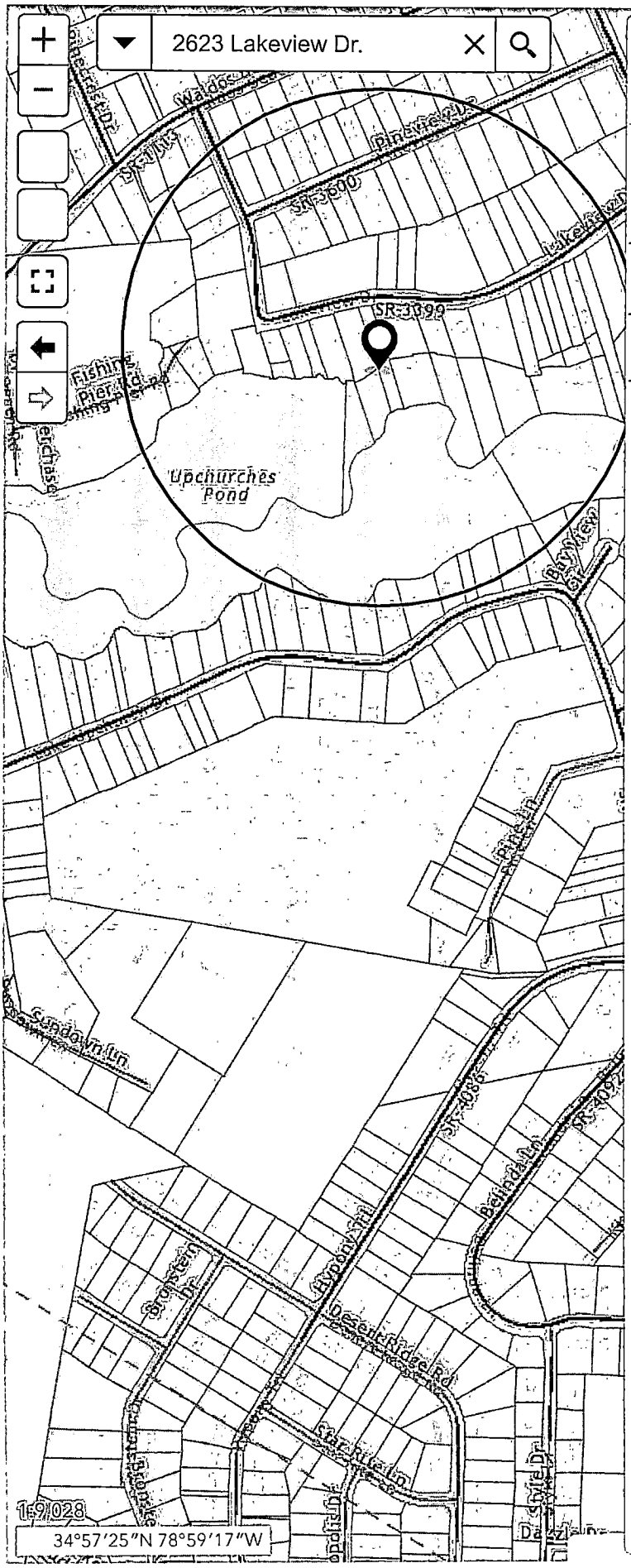
Celestine Rainer Smith
Signature of County Environmental Health Specialist

Celestine Rainer-Smith
Print or Type Full Name of County Environmental Health Specialist

Per 15A NCAC 02C .0118 the Secretary of the Division of Water Quality or the Division of Public Health may require submittal of information deemed necessary to make a decision on the variance, may impose conditions as part of the decision, and shall respond in writing to the request within 30 days of receipt of the variance request. A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition as described in G.S. 150B-23 within 60 days after receipt of the decision.

Well Permit Decision Tool

How to U



Screening

Report

Back | Area : 3,134,508.61 ft²

Known Releases of Contamination (0)

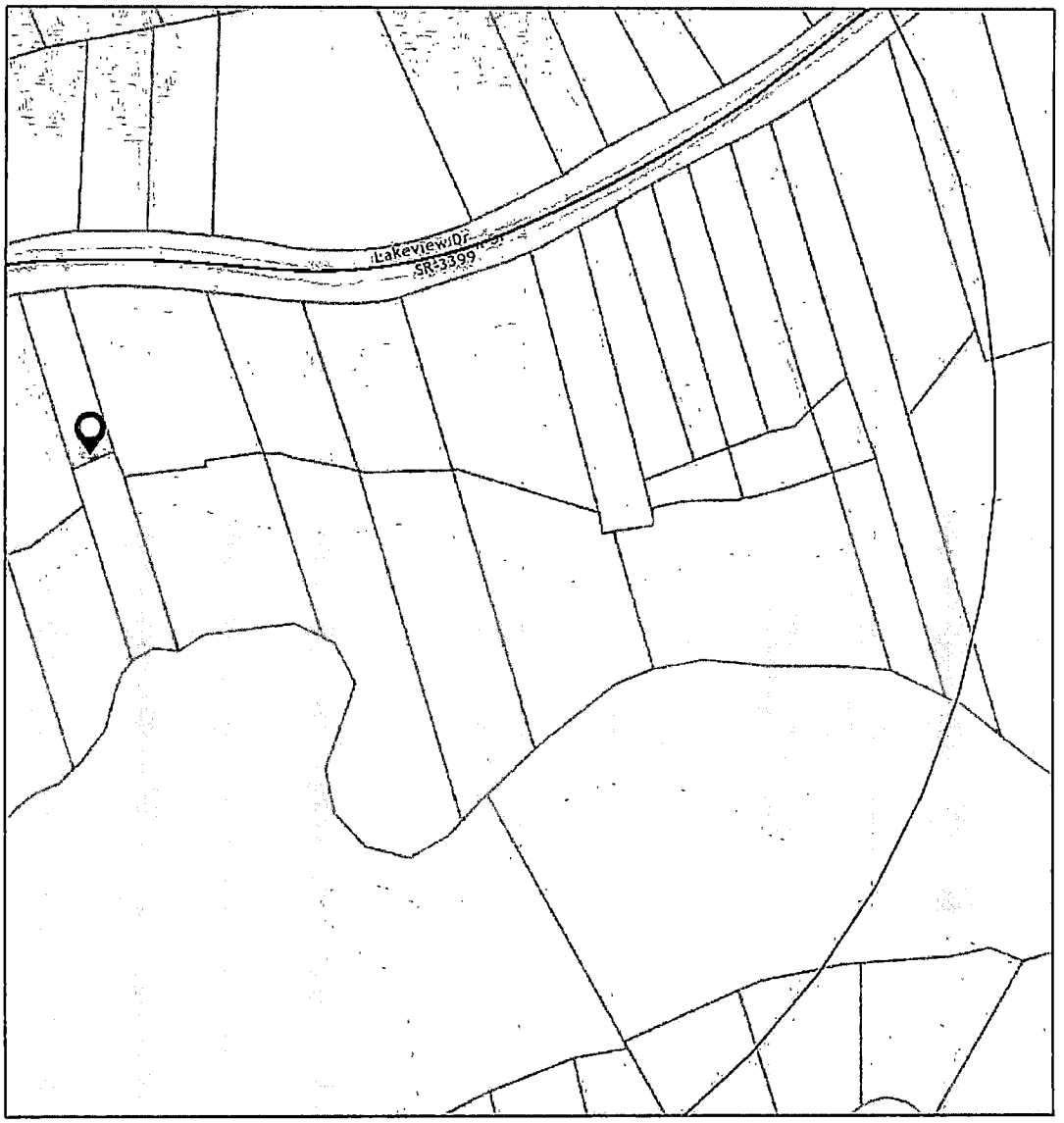
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 29 2020 7:46:21 Eastern Daylight Time



1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

Parcels (Polygons) - Parcels

Non-System Roads

Federal Route

Non-System

Other System Roads

Ramps, Rest Areas, Non-Mainline

Projected Route

Other State Agency Route

Secondary Route

Primary Roads

Interstate

US Route

2623 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
November 3, 2020

William Dean
5733 Rockfish Rd.
Hope Mills, NC 28346

RE: Approval No. WWM1113
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2623 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Dean:

On November 3, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2623 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 12, 2020

Dagmar Voss
2633 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1068
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2633 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On August 12, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a non-water tight sanitary sewer line less than 100' to the water supply well at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) The well shall be sampled for bacteria and inorganic analysis.
2) If sample results indicate contaminants, further repairs and/or treatment may be recommended.
3) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 12, 2020

Rosina Newton
PO Box 48084
Cumberland, NC 28331

RE: Approval No. WWM1066
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2643 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On August 12, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a non-water tight sanitary sewer line less than 100' to the water supply well at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) The well shall be sampled for bacteria and inorganic analysis.
2) If sample results indicate contaminants, further repairs and/or treatment may be recommended.
3) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1348			Date:	10/27/2020
PIN:	9493-49-8544				
Address	2653 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	6	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] *Date:* 10-29-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

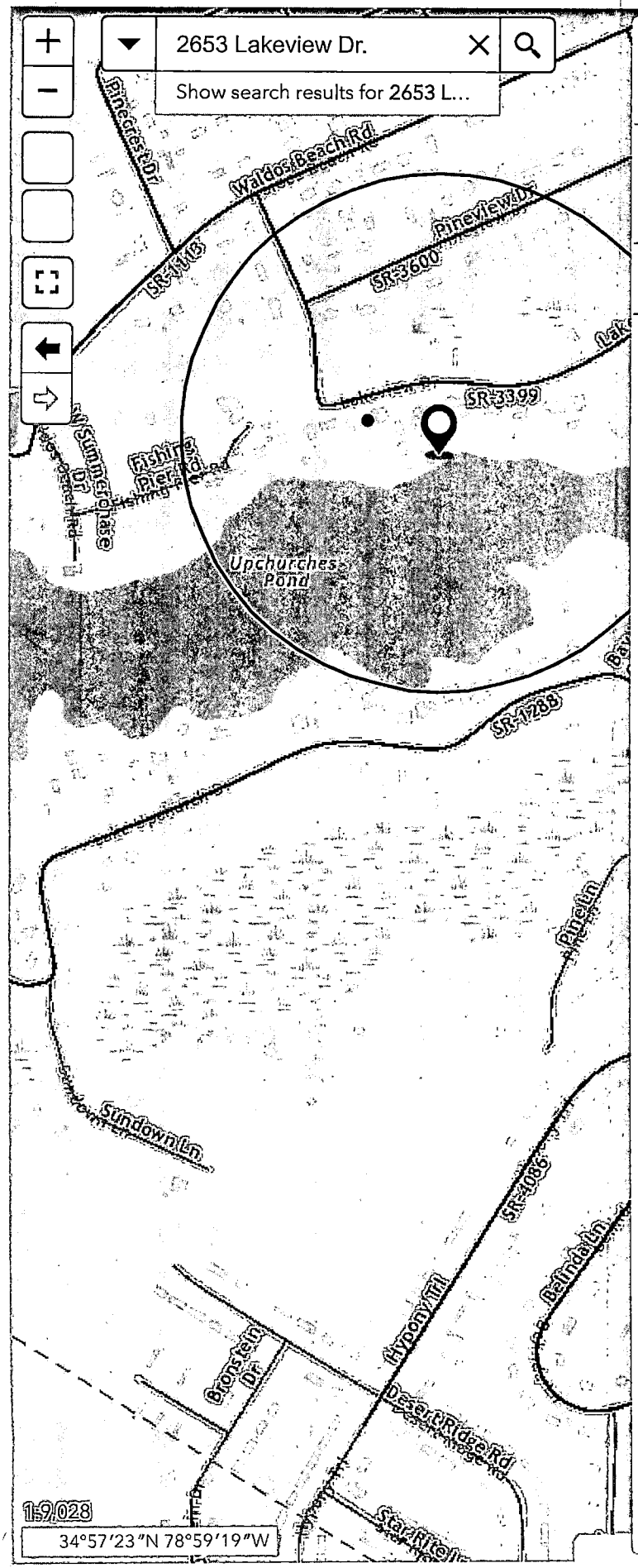
Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

Well Permit Decision Tool

How to U



Screening

Report

Back Area : 3,134,508.61 ft²

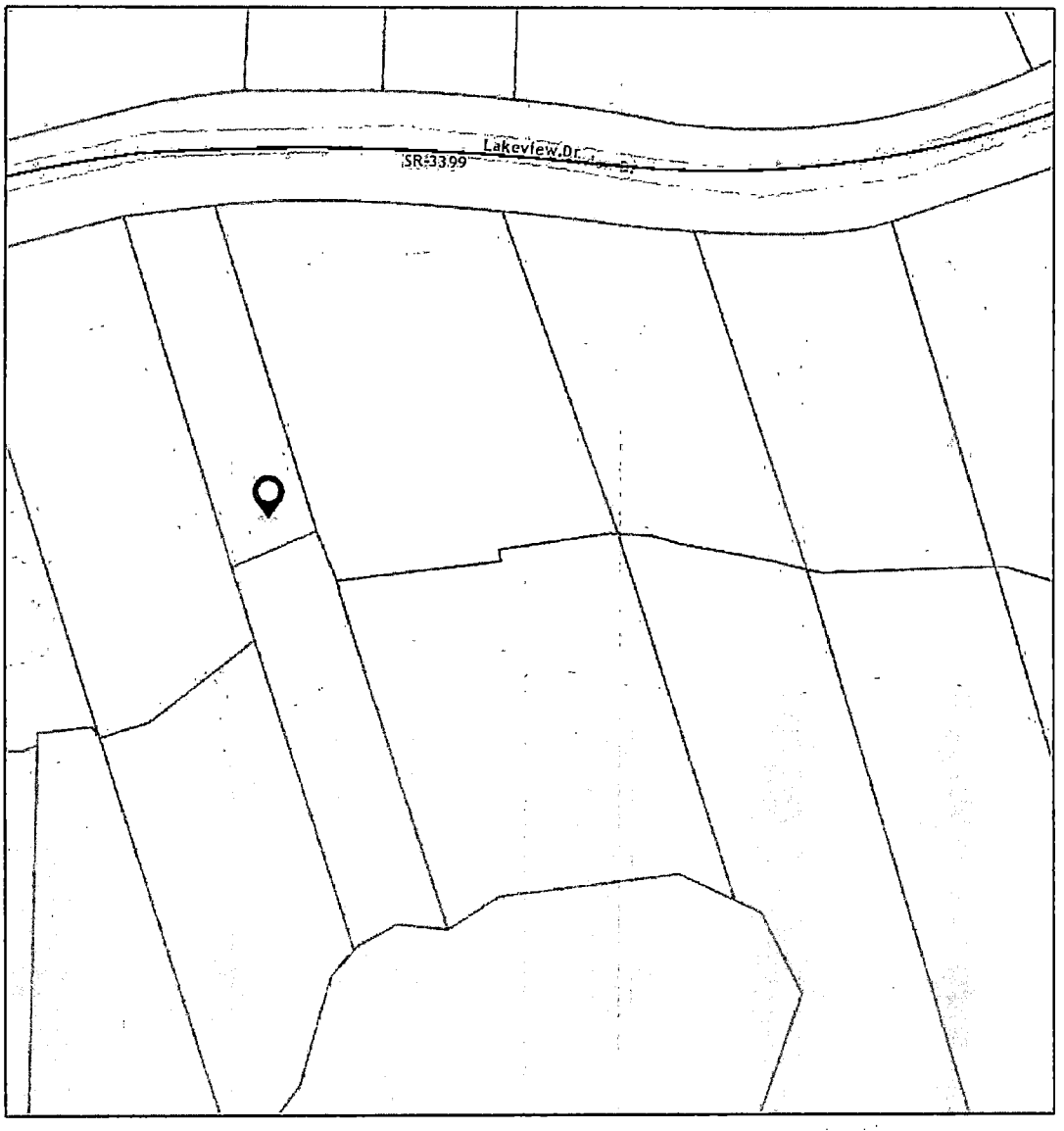
Known Releases of Contamination (0)

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

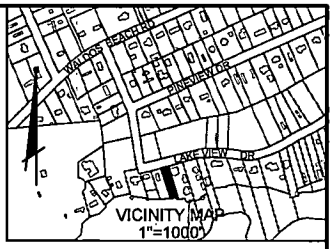
Oct 29 2020 7:49:33 Eastern Daylight Time



2653 Lakeview Dr.

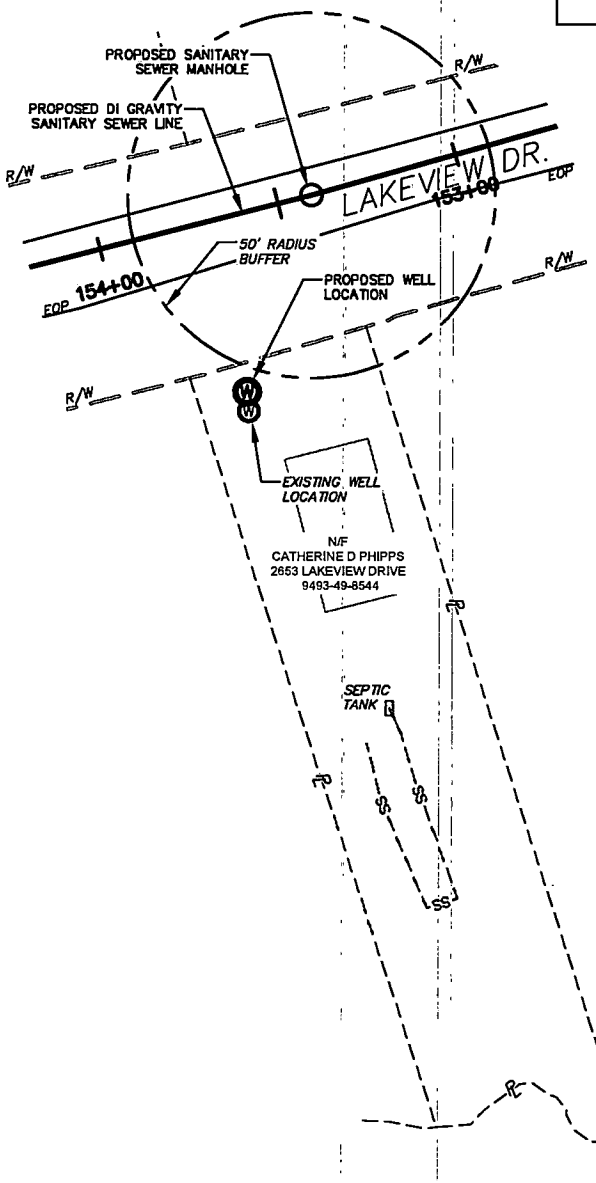
THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
CATHERINE D PHIPPS
PIN# 9493-49-8544



N

N.C. GRID (NAD83/07)



LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
---PR---	PROPERTY LINE
---SS---	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" = 40'

0 20 40 80 120

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL—CONTRACT 2 OWI PROJECT NO. CS370434-15/16.
5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING, PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:		DATE	REVISIONS
LAYOUT BY:	DATE: 10/09/20		
PLAN/PROF. BY:	DWH		
DESIGN REVIEW BY: W/R ENGR. DEPT			
APPROVED BY:			
SCALE: HOR: 1"=40' VERT: 1"=		SHT: 4 OF 10	

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 17, 2020

Jeffrey Bryant
2659 Lakeview Dr.
Fayetteville, NC 28306

RE: Approval No. WWM1070
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2659 Lakeview Dr., Fayetteville, NC 28306

Dear Mr. Bryant:

On August 17, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

FRI

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1065			Date:	8/11/2020
PIN:	9493-49-7583				
Address	2659 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	5	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: Celia Ellis *Date:* 8-14-2020

See Attached Site Plan

Well Grout

Driller: *Date:*

Grout Depth 0 Ft *Type Of Well:*

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

*****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668*****

Well Grout Approved By: *Date:*

FINAL WELL APPROVAL

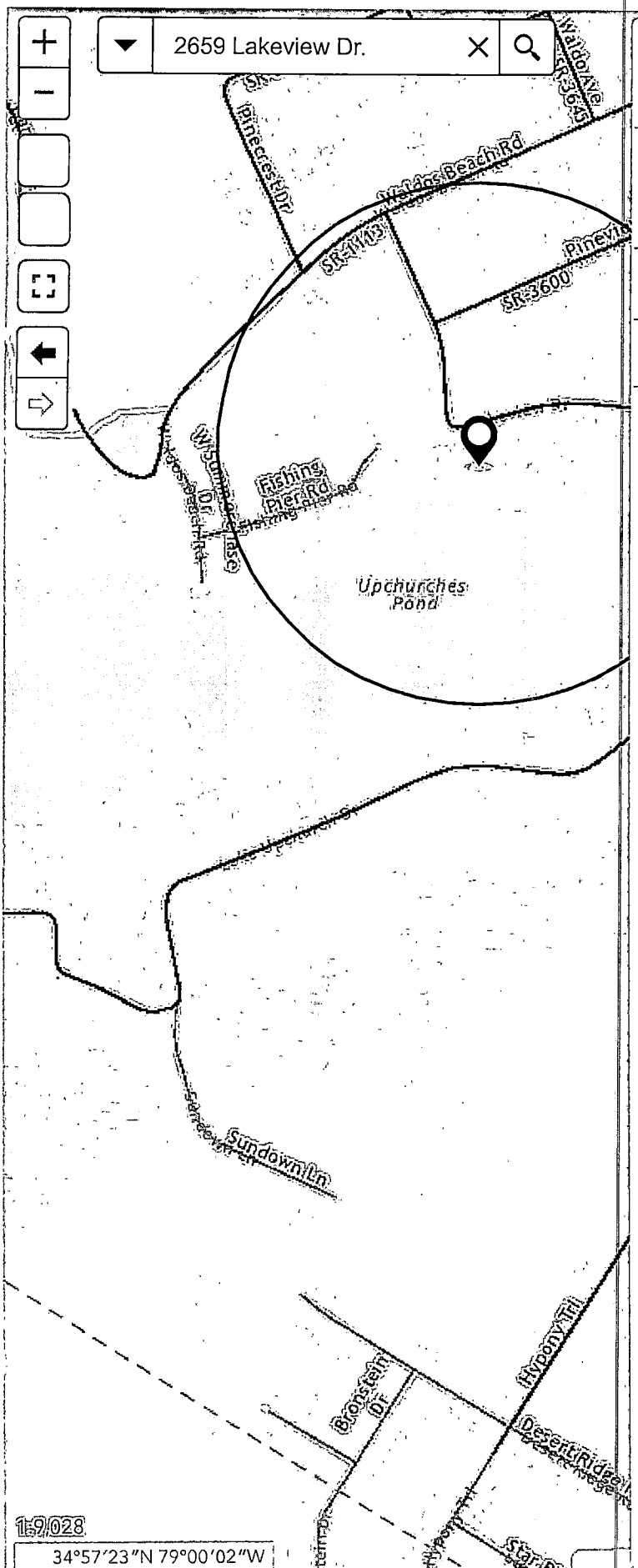
Final Well Approved By: *Date:*

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

Well Permit Decision Tool

How to U



Screening

Report

Back

Area : 3,134,508.65 ft²

Known Releases of Contamination (0)

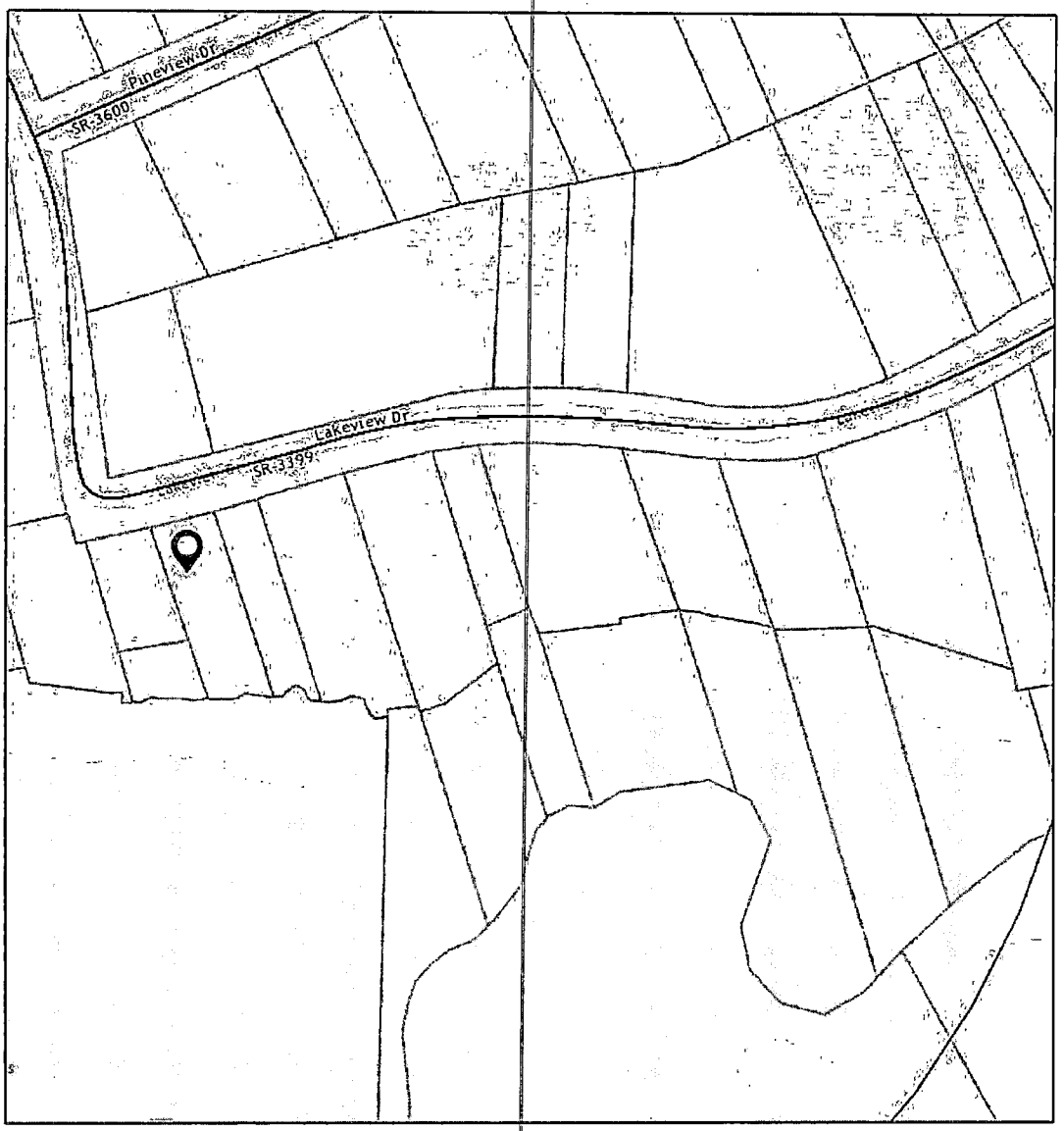
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.65 ft²

Aug 12 2020 9:10:26 Eastern Daylight Time



1:2,257

0 0.01 0.03 0.05 mi

0 0.03 0.05 0.1 km

Parcels (Polygons) - Parcels
Non-System Roads
Federal Route
Non-System
Other System Roads
Ramps, Rest Areas, Non-Mainline
Projected Route
Other State Agency Route
Secondary Route
Primary Roads
Interstate
US Route

2659 Lakeview Dr.

Cumberland County Department of Public Health
Environmental Health Division

N
W E
S

30 15 0 30 Feet

COUNTY OF CUMBERLAND
FOUNDED 1754
NORTH CAROLINA

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 29, 2020

Ellis Ehle
PO Box 48121
Fayetteville, NC 28331

RE: Approval No. WWM1109
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2667 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On October 29, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2667 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1349			Date:	10/27/2020
PIN:	9493-49-7503				
Address	2667 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)	3	Section	
Applicant:	BILL'S WELL DRILLING CO.	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] Date: 10-29-2020

See Attached Site Plan

Well Grout

Driller: Date:

Grout Depth 0 Ft Type Of Well:

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668****

Well Grout Approved By: Date:

FINAL WELL APPROVAL

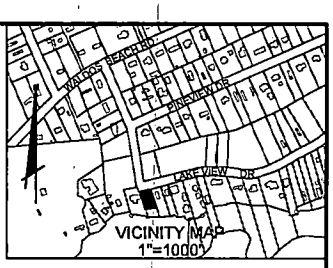
Final Well Approved By: Date:

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Other Information:

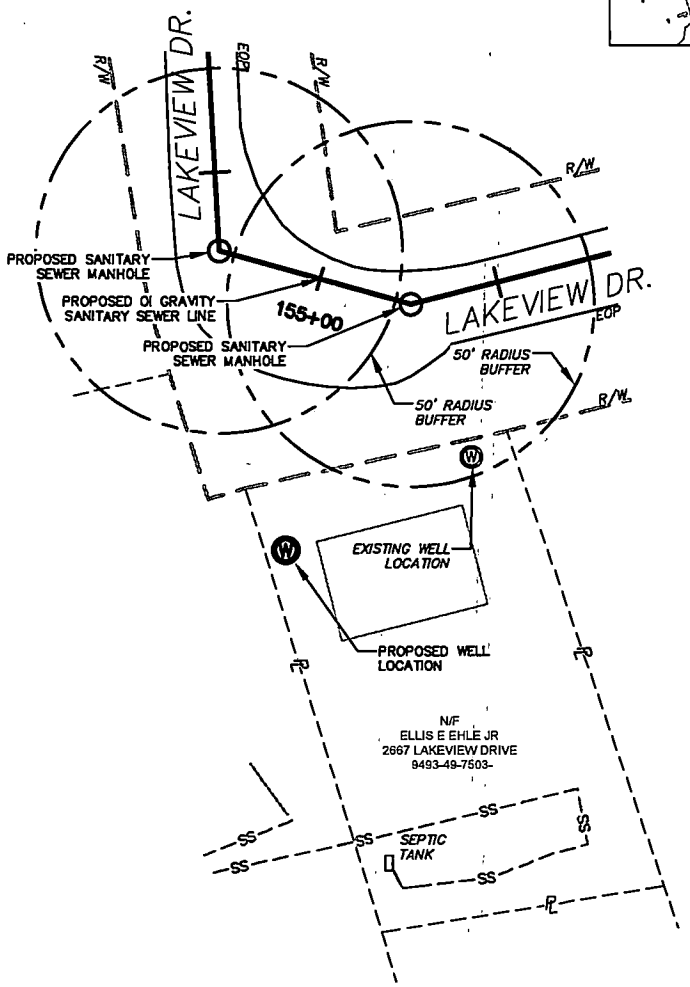
THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

EXHIBIT MAP 1
WELL RELOCATION ON THE LANDS OF ELLIS E EHLE JR
PIN# 9493-49-7503



N

N.C. GRID (NAD83/01)



LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——PL——	PROPERTY LINE
——SS——	SANITARY SEWER DRAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" = 40'

0 20 40 80 120

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL–CONTRACT 2 DWI PROJECT NO. CS370434–15/16.
5. SEPTIC TANK AND DRAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING, PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:	
LAYOUT BY:	DATE: 10/09/20
PLAN/PROF. BY:	DWH
DESIGN REVIEW BY:	W/R ENGR. DEPT
APPROVED BY:	
SCALE: HOR:	1"=40' VERT: 1"=

DATE	REVISIONS	BY

SHT: 2 OF 10

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

VARIANCE APPLICATION FOR 2C .0100 WELL CONSTRUCTION STANDARDS:

PRIVATE DRINKING WATER WELLS UNDER 15A NCAC 02C .0300

WATER SUPPLY WELLS UNDER 15A NCAC 02C .0107
All water supply wells not considered "Private Drinking Water Wells" and including irrigation, industrial, and commercial wells.

WELLS OTHER THAN WATER SUPPLY UNDER 15A NCAC 02C .0108
Including monitoring and recovery wells.

Print clearly or type information. Illegible submittals will be returned as incomplete.

DATE: October 29, 20___ **PERMIT NO.:** 2020-1349 (to be completed by DWQ/DPH)

A. WELL OWNER – For single family residences list the property owner(s). For all others, list name of the business, organization, or government agency and person delegated signature authority:

Ellis Ehle

Mailing Address: PO Box 78121
City: Cumberland State: NC Zip Code: 28331 County:
Day Tele No.: 910 850 7558 Cell No.:
EMAIL Address: eehlejr@rcn.com Fax No.:

B. PHYSICAL LOCATION OF WELL SITE

(1) Parcel Identification Number (PIN) of well site: 9493-49-7503
County: Cumberland

(2) Physical Address (if different than mailing address): 2667 Lakeview Dr
City: Fayetteville State: NC Zip Code: 28306

C. WELL DRILLER INFORMATION (if known)
Well Drilling Contractor's Name: Jonathan Kamionka
NC Well Drilling Contractor Certification No.: 3465-A
Company Name: Bill's Well Drilling Co Contact Person:
City: Fayetteville State: NC Zip Code: 28311 County: Cumberland
Day Tele No.: 9104883740 Cell No.: 9108508754
EMAIL Address: office@billswelldrilling.com Fax No.:

D. **REASON FOR VARIANCE REQUEST** – Include type of well(s) to be constructed; rule for which the variance is being requested; description of how the alternate construction will not endanger human health and welfare and the environment; and reason why construction and/or operation in accordance with the standards is not technically feasible and/or provides equal or better protection of the groundwater.

New Rockwell will be less than 100' from manhole

E. **ATTACHMENTS** – Provide the following information as attachments to this application:

(1) A map showing general location of the property (including road names, NC State Route Number, distances, any key landmarks, etc.) sufficient for finding the well location.
(2) Detailed site map with scale showing location of proposed well relevant to septic system(s), building foundations, property lines, water bodies, potential sources of contamination, other wells, etc.
(3) Submit a copy of the local well permit application and site evaluation map (if applicable).
(4) Any other information relevant to the variance request such as a well construction diagram showing proposed well liner or atypical construction materials/methods.

F. **OTHER MINIMUM CONSTRUCTION REQUIREMENTS**

For water supply wells, approval of a variance will require that additional construction requirements beyond those specified in 15A NCAC 02C .0107 be met. Minimum additional construction requirements for Coastal Plain and Piedmont and Mountain region wells are referenced on Attachments A and B on pages 4 and 5 of this application. Approval of a variance will not be considered in cases where the specified minimum additional construction requirements cannot be met.

G. **SIGNATURES**

Jonathan Kamionka
Signature of Person Responsible for Well Construction (typically the well driller)

Jonathon Kamionka
Print or Type Full Name of Person Responsible for Well Construction (typically the well driller)

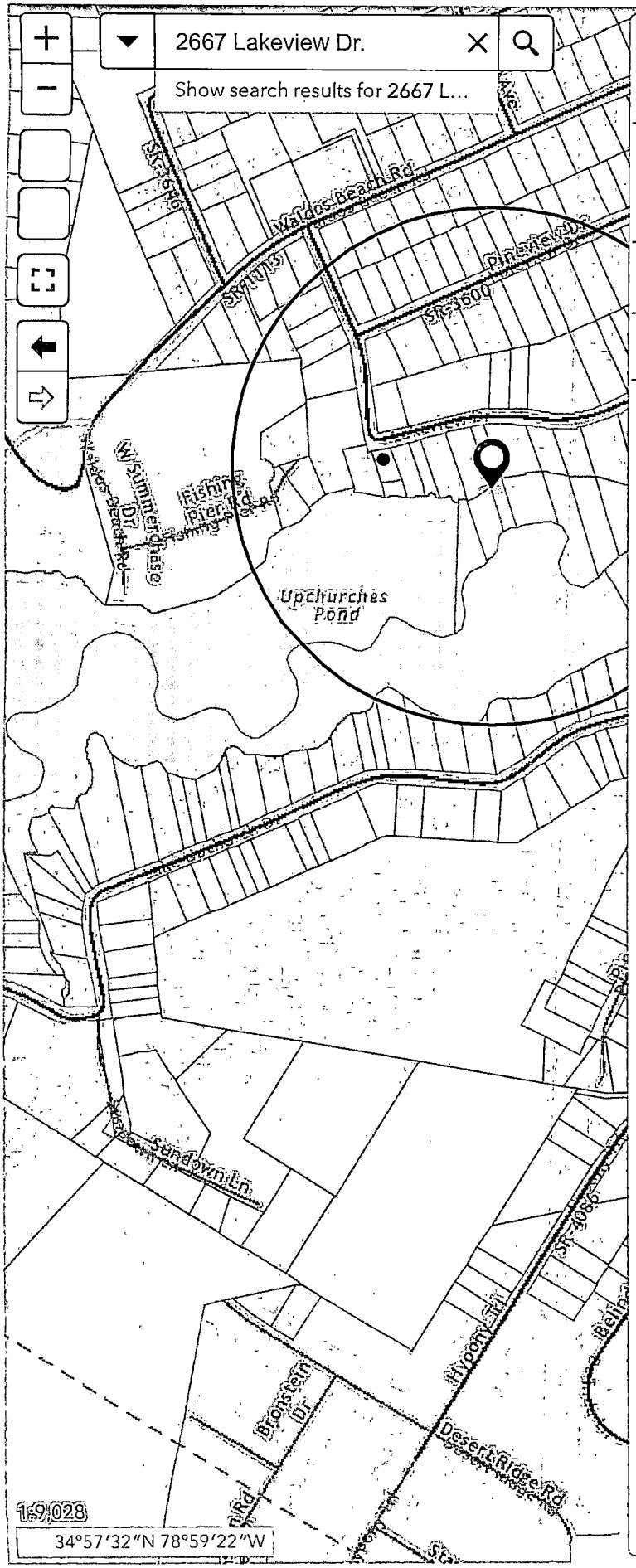
Celestine Rainesi-Smith
Signature of County Environmental Health Specialist

Celestine Rainesi-Smith
Print or Type Full Name of County Environmental Health Specialist

Per 15A NCAC 02C .0118 the Secretary of the Division of Water Quality or the Division of Public Health may require submittal of information deemed necessary to make a decision on the variance, may impose conditions as part of the decision, and shall respond in writing to the request within 30 days of receipt of the variance request. A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition as described in G.S. 150B-23 within 60 days after receipt of the decision.

Well Permit Decision Tool

How to U



Screening

Report

Back Area : 3,134,508.61 ft²

Known Releases of Contamination (0)

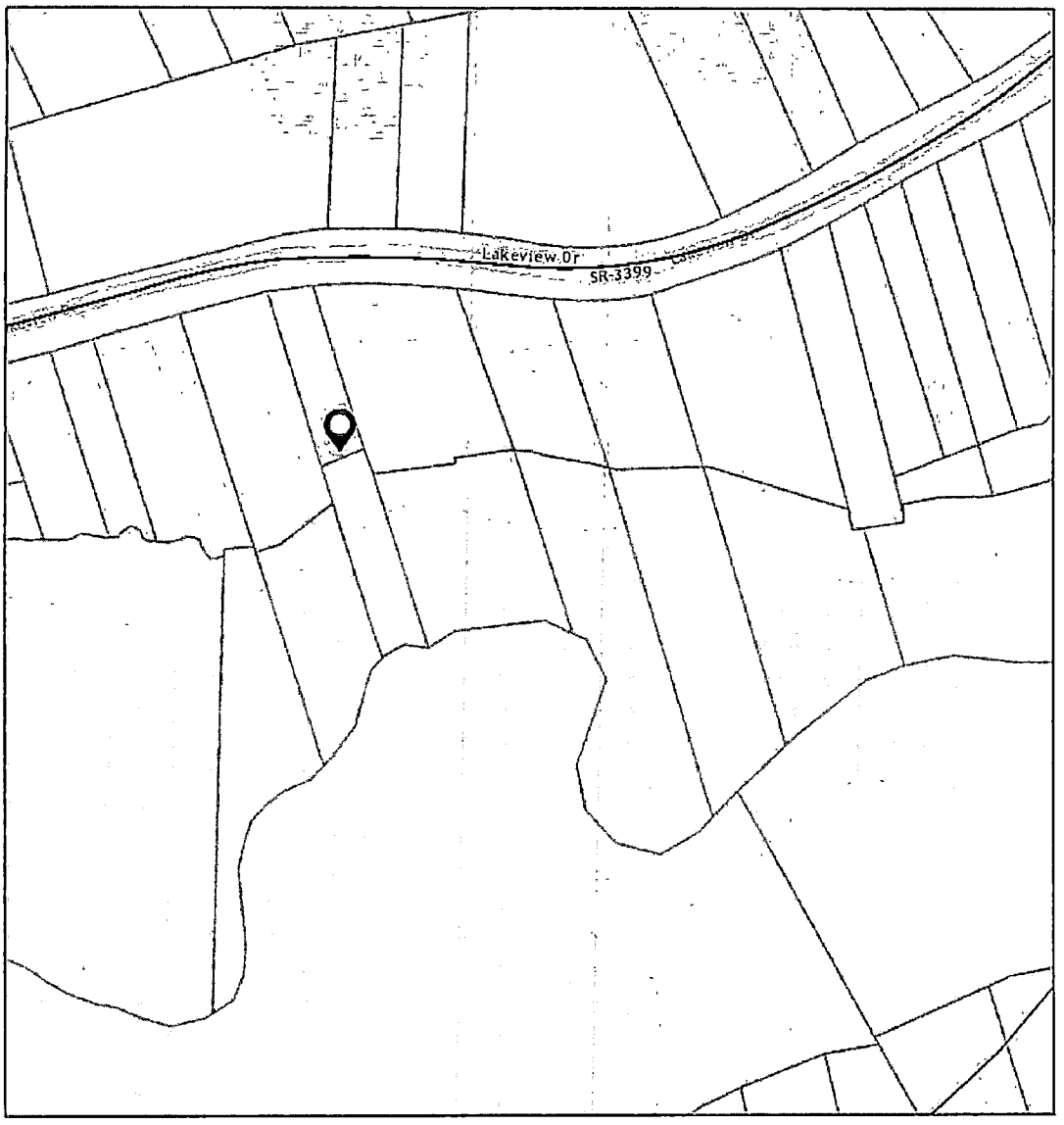
No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 29 2020 7:55:13 Eastern Daylight Time



Parcels (Polygons) - Parcels

Non-System Roads

Federal Route

Non-System

Other System Roads

Ramps, Rest Areas, Non-Mainline

Projected Route

Other State Agency Route

Secondary Route

Primary Roads

Interstate

US Route

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

2667 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 29, 2020

Ellis Ehle
PO Box 48121
Fayetteville, NC 28331

RE: Approval No. WWM1109
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2667 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On October 29, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2667 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 29, 2020

Ellis Ehle
PO Box 48121
Fayetteville, NC 28331

RE: Approval No. WWM1110
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2673 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On October 29, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2673 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2020	1350			Date:	10/27/2020
PIN:	9493-49-6511				
Address	2673 LAKEVIEW DRIVE	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	BILL'S WELL DRILLING	Applicant Type	Contractor / Builder		
Mailing Address:	800 MCARTHUR ROAD	City	Fayetteville	Zip	28311-

Permit To Construct

Permit Issued By: [signature] Date: 10-29-2020

See Attached Site Plan

Well Grout

Driller: Date:

Grout Depth 0 Ft Type Of Well:

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

****OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668****

Well Grout Approved By: Date:

FINAL WELL APPROVAL

Final Well Approved By: Date:

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

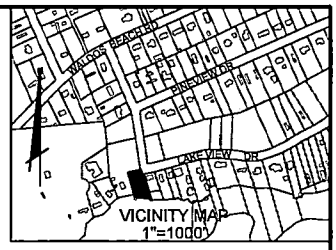
Other Information:

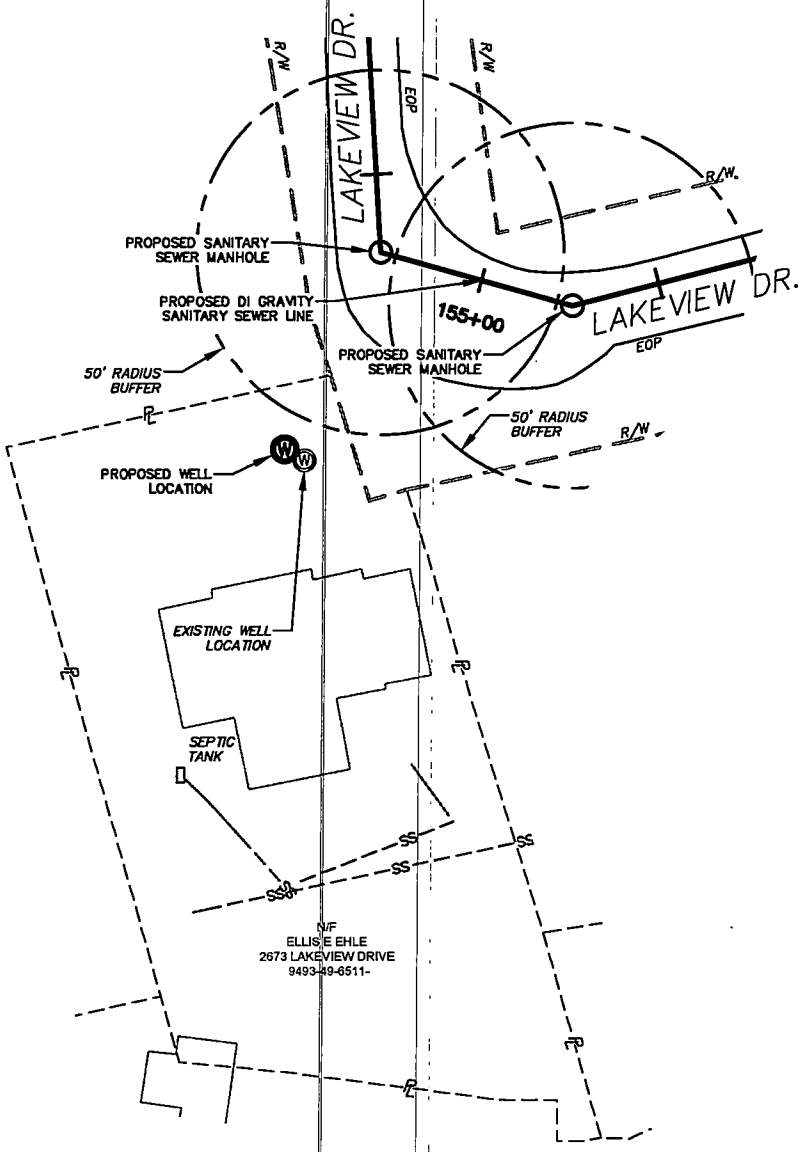
EXHIBIT MAP 1
WELL RELOCATION
ON THE LANDS OF
ELLIS E EHLE
PIN# 9493-49-6511

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH ANY APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

N

N.C. GRID (NAD83/01)





LEGEND

O	PROPOSED SANITARY SEWER MANHOLE
———	PROPOSED GRAVITY SANITARY SEWER
——℄———	PROPERTY LINE
——SS———	SANITARY SEWER ORAIN LINES
MH	MANHOLE
EOP	EDGE OF PAVEMENT
R/W	RIGHT-OF-WAY

SCALE: 1" = 40'

0 20 40 80 120

NOTES:
1. PROPERTY LINES SHOWN AS DASHED LINES ON THIS EXHIBIT WERE TAKEN FROM CUMBERLAND COUNTY GIS DATA. MCKIM & CREED, INC. HAS NOT SURVEYED ANY PROPERTY CORNERS OR PROPERTY LINES AT THIS TIME.
2. THE EXISTING WELL, PROPOSED WELL AND EXISTING SEPTIC TANK/FIELDS SHOWN ON THIS EXHIBIT WERE FIELD LOCATED BY MCKIM & CREED, INC.
3. THE PROPOSED SANITARY SEWER IMPROVEMENTS SHOWN WERE TAKEN FROM ENGINEERING DRAWINGS OF BIG ROCK FISH CREEK OUTFALL SEWER IMPROVEMENTS DATED JULY 2020 AND PREPARED BY MCKIM & CREED, INC..
4. PROPOSED SANITARY SEWER CAN BE REFERENCED ON MCKIM&CREED FINAL DESIGN DRAWING TITLED "SANITARY SEWER IMPROVEMENTS BIG ROCKFISH CREEK OUTFALL-CONTRACT 2 DWI PROJECT NO. CS370434-15/16.
5. SEPTIC TANK AND ORAIN FIELD WAS LOCATED AND FLAGGED BY GROUND TRUTH SOIL CONSULTING. PLLC. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING FLAGGED CONDITIONS.
6. PROPOSED WELL LOCATIONS TO MAINTAIN A MINIMUM SEPARATION OF 50 FEET FROM THE PROPOSED GRAVITY SANITARY SEWER WERE MARKED BY BILLS WELL DRILLING. MCKIM&CREED WAS RESPONSIBLE FOR SURVEYING STAKED PROPOSED LOCATIONS.

PUBLIC WORKS COMMISSION
OF THE CITY OF FAYETTEVILLE
PWC WATER RESOURCES ENGINEERING
955 OLD WILMINGTON RD.
FAYETTEVILLE, N.C. 28301
(910) 223-4730

SURVEY/GPS BY:		DATE	REVISIONS
LAYOUT BY:	DATE: 10/09/20		
PLAN/PROF. BY: DWH			
DESIGN REVIEW BY: W/R ENGR. DEPT			
APPROVED BY:			
SCALE: HOR: 1"=40' VERT: 1"=		SHT: 1 OF 10	

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

VARIANCE APPLICATION FOR 2C .0100 WELL CONSTRUCTION STANDARDS:

PRIVATE DRINKING WATER WELLS UNDER 15A NCAC 02C .0300

WATER SUPPLY WELLS UNDER 15A NCAC 02C .0107
All water supply wells not considered "Private Drinking Water Wells" and including irrigation, industrial, and commercial wells.

WELLS OTHER THAN WATER SUPPLY UNDER 15A NCAC 02C .0108
Including monitoring and recovery wells.

Print clearly or type information. Illegible submittals will be returned as incomplete.

DATE: October 29, 2020 **PERMIT NO.:** 2020-1350 (to be completed by DWQ/DPH)

A. WELL OWNER – For single family residences list the property owner(s). For all others, list name of the business, organization, or government agency and person delegated signature authority:

Ellis Ehle

Mailing Address: PO Box 48121

City: Cumberland State: NC Zip Code: 28331 County:

Day Tele No.: 9108507558 Cell No.:

EMAIL Address: eehlejr@nc.rr.com Fax No.:

B. PHYSICAL LOCATION OF WELL SITE

(1) Parcel Identification Number (PIN) of well site: 9493-49-6511

County: Cumberland

(2) Physical Address (if different than mailing address): 2673 Lakeview Dr

City: Fayetteville State: NC Zip Code: 28306

C. WELL DRILLER INFORMATION (if known)

Well Drilling Contractor's Name: Jonathan Kamionka

NC Well Drilling Contractor Certification No.: 3465-A

Company Name: Bill's Well Drilling Co Contact Person:

City: Fayetteville State: NC Zip Code: 28311 County: Cumberland

Day Tele No.: 9104883740 Cell No.: 9108508754

EMAIL Address: office@billswelldrilling.com Fax No.:

D. **REASON FOR VARIANCE REQUEST** – Include type of well(s) to be constructed; rule for which the variance is being requested; description of how the alternate construction will not endanger human health and welfare and the environment; and reason why construction and/or operation in accordance with the standards is not technically feasible and/or provides equal or better protection of the groundwater.

New Rockwell will be less than 100' from manhole

E. **ATTACHMENTS** – Provide the following information as attachments to this application:

(1) A map showing general location of the property (including road names, NC State Route Number, distances, any key landmarks, etc.) sufficient for finding the well location.
(2) Detailed site map with scale showing location of proposed well relevant to septic system(s), building foundations, property lines, water bodies, potential sources of contamination, other wells, etc.
(3) Submit a copy of the local well permit application and site evaluation map (if applicable).
(4) Any other information relevant to the variance request such as a well construction diagram showing proposed well liner or atypical construction materials/methods.

F. **OTHER MINIMUM CONSTRUCTION REQUIREMENTS**

For water supply wells, approval of a variance will require that additional construction requirements beyond those specified in 15A NCAC 02C .0107 be met. Minimum additional construction requirements for Coastal Plain and Piedmont and Mountain region wells are referenced on Attachments A and B on pages 4 and 5 of this application. Approval of a variance will not be considered in cases where the specified minimum additional construction requirements cannot be met.

G. **SIGNATURES**

Signature of Person Responsible for Well Construction (typically the well driller)

Jonathan Kamionka

Print or Type Full Name of Person Responsible for Well Construction (typically the well driller)

Signature of County Environmental Health Specialist

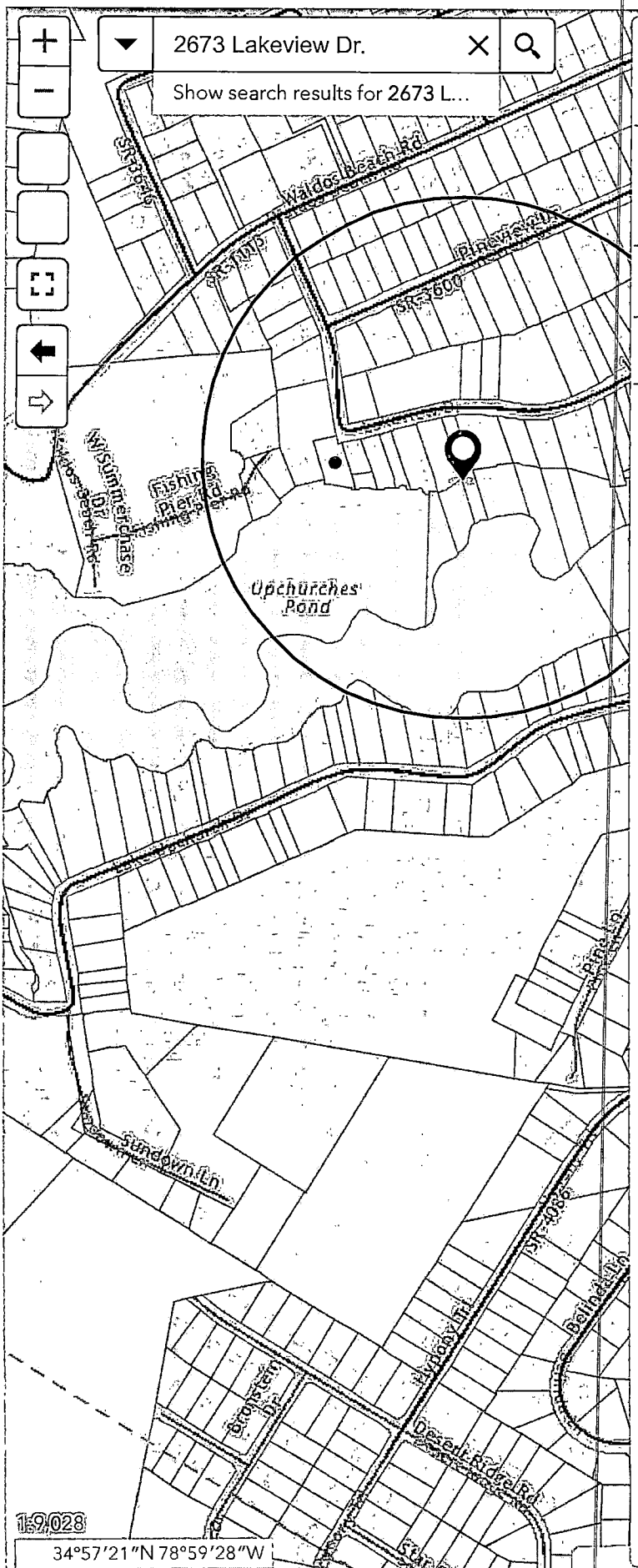
Celesthe Rainey-Smith

Print or Type Full Name of County Environmental Health Specialist

Per 15A NCAC 02C .0118 the Secretary of the Division of Water Quality or the Division of Public Health may require submittal of information deemed necessary to make a decision on the variance, may impose conditions as part of the decision, and shall respond in writing to the request within 30 days of receipt of the variance request. A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition as described in G.S. 150B-23 within 60 days after receipt of the decision.

Well Permit Decision Tool

How to U



Screening

Report

Back

Area : 3,134,508.61 ft²

Known Releases of Contamination (0)

No results found

WPDT Report

Area of Interest (AOI) Information

Area : 3,134,508.61 ft²

Oct 29 2020 7:57:05 Eastern Daylight Time

Parcels (Polygons) - Parcels

Non-System Roads

- Federal Route
- Non-System

Other System Roads

- Ramps, Rest Areas, Non-Mainline
- Projected Route
- Other State Agency Route
- Secondary Route

Primary Roads

- Interstate
- US Route

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

2673 Lakeview Dr.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
October 29, 2020

Ellis Ehle
PO Box 48121
Fayetteville, NC 28331

RE: Approval No. WWM1110
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
2673 Lakeview Dr., Fayetteville, NC 28306

To Whom it May Concern:

On October 29, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a water supply well to be located less than 100' from a non-water tight sanitary sewer line at 2673 Lakeview Dr., Fayetteville, NC.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) Grout will be required the **entire length** of the casing from land surface into gravel pack/confining layer.
2) The well shall be sampled for bacteria and inorganics.
3) No potential sources of groundwater contamination shall be stored near the well-head.
4) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

WWW.NCDHHS.GOV
TEL 919-707-5874 • FAX 919-845-3972
LOCATION: 5605 SIX FORKS RD • RALEIGH, NC 27609
MAILING ADDRESS: 1642 MAIL SERVICE CENTER • RALEIGH, NC 27699-1642
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

MARK BENTON
DIRECTOR

Onsite Water Protection Branch
August 12, 2020

Roy Dean
6742 Waldos Beach Rd.
Fayetteville, NC 28306

RE: Approval No. WWM1064
Water Supply Well Less than 100' from a Manhole 15A NCAC 02C. 107(a)(2)(E)
6745 Waldos Beach Rd., Fayetteville, NC 28306

Dear Mr. Dean:

On August 12, 2020, the On-Site Water Protection Branch received your request for a variance to rule 15A NCAC 02C. 107(a)(2)(E to allow the installation of a non-water tight sanitary sewer line less than 100' to the water supply well at the subject site.

Based upon information provided by the Cumberland County Environmental Health Department and the property owner, it is my finding that based on current conditions as the site exists today, you meet the conditions necessary for approval of a variance as specified by 15A NCAC 2C .0118 (a) (1) and (2). On that basis and provided that the following conditions are met, the requested variance is approved:

1) The well shall be sampled for bacteria and inorganic analysis.
2) The water sample results may indicate whether there are any pre-existing (prior to sewer line installation) water quality concerns that you may not be aware of and the Division of Public Health can provide guidance should you have questions concerning your well water quality.
3) The well shall meet current 2C. 0100 rules, including but not limited to being 12" above land surface, properly sealed, and adequately vented.

The approval of this variance does not affect any of the other requirements or limitations of the Well Construction Standards, including but not limited to the requirements in 15A NCAC 2C .0113(b) to repair or to abandon any well which acts as a source or channel for the migration of contamination or to your responsibility to comply with any other applicable Federal, State, or local laws or regulations. Furthermore, the granting of this approval is for the well location only, and in no way relieves the owner or agent from other requirements of the North Carolina Well Construction Standards, or any other applicable law, rule, or regulation that may be regulated by other agencies, nor does it imply sufficient water quality.

If you have any questions regarding this variance, please contact Wilson Mize at (919) -270-9665

Sincerely,

Wilson Mize

Wilson Mize R.E.H.S.

SCANNED

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2010	158			Date:	2/15/2010
PIN:	9493-69-1976				
Address	2541 Lakeview Dr. 2507	City	~~Hope Mills~~ Fay	Zip	~~28348~~ 28306
Subdivision:	Waldo's Beach Estates	Lot(s)		Section	
Applicant:	Lance, Scott Ray	Applicant Type	Owner		
Mailing Address:	238 North Fayetteville St.	City	Parkton	Zip	28371-

Permit To Construct

Permit Issued By: [signature] Date: 2/15/10

See Attached Site Plan

Driller: Bills wells Well Grout Date: 3/1/10

Grout Depth ~~20~~ 20' Type Of Well: Drilled

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL, INORGANIC AND NITRATE WATER SAMPLE.

OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3668

Well Grout Approved By: [signature] Date: 3/1/10

FINAL WELL APPROVAL

well kit ✓ 8/23/10

Final Well Approved By: Date:

NOTE: WELL LOG AND WATER SAMPLES ATTACHED

Back 9/15/10

Other Information:

2507 2514 Lakeview

RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environmental and Natural Resources - Division of Water Quality

CERTIFICATION 3092

1. WELL CONTRACTOR:
Bill's Well Drilling
WELL CONTRACTOR (Individual) NAME
John Garcia
STREET ADDRESS 800 McArthur Rd
Fayetteville, NC 28311
(910) 488-3740

2. WELL INFORMATION:
WELL ID #
State Well Permit # 2010-158
Other Permit
WELL USE: Residential
DATE DRILLED: 7/1/2010
TIME COMPLETED: 4:30 PM

3. WELL LOCATION:
City Hope Mills County Cumberland
2511 Lakeview Dr Hope Mills 26346 Lot
Street Name, Numbers,, Community, Subdivision, Lot No, Zip Code

TOPOGRAPHIC / LAND SETTING
Flat
LATITUDE / LONGITUDE OF WELL LOCATION:

Latitude/Longitude Source: Topographic Map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

4. WELL OWNER:
OWNER'S NAME Scott Lance
STREET ADDRESS 238 North Fayetteville St
Parkton NC 28371

Area code- Phone number

5. WELL DETAILS:
a. **TOTAL DEPTH:** 31
b. **DOES WELL REPLACE EXISTING WELL?** No
c. **WATER LEVEL Below top of Casing:** 7
d. **TOP OF CASING IS** 1 FT. Above Land Surface*
(Use "+" if Above Top of Casing)
* Top of casing terminated at or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
e. **YIELD (gpm):** 15 **METHOD OF TEST** Bailer
f. **DISINFECTION : Type** HTH **Amount** 2

g. WATER ZONES (Depth)

From	21	To	27	From	To
From		To		From	To
From		To		From	To

6. CASING:

	Depth			Diameter	Thickness/ Weight	Material
From	1	To	21 Ft.	4	sch40	PVC plastic
From	27	To	31 Ft.	4	sch40	PVC plastic
From		To	Ft.			

7. GROUT:

	Depth			Material	Method
From	0	To	20 Ft.	Cement	Poured
From		To	Ft.		
From		To	Ft.		

8. SCREEN:

	Depth			Diameter		Slot Size		Material
From	21	To	27 Ft.	4	in.	10	In	PVC slotted
From		To	Ft.		in.		In	
From		To	Ft.		in.		In	

9. SAND/GRAVEL PACK:

	Depth			Size/ Material
From	20	To	35 Ft.	Gravel
From		To	Ft.	
From		To	Ft.	

10. DRILLING LOG

From	To	Formation description
0	2	Orange & brown Sandy Clay
2	6	Black & Gray Clay
6	13	White Sand
13	14	Gray Clay
14	26	Tan Wood Sand
26	29	Gray Clay
29	55	Gray Sandy Clay

11. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE 7/9/2010 DATE

John Garcia

Submit the original to the Division of Water Quality within 30 days.
Attn: Information Mgt., 1617 Mail Service Center -- Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Cumberland County Department of Public Health
130 Gillespie Street
Fayetteville NC 28301-5417
(910) 433-3668

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: **7/11/2014** **REPAIR PERMIT SEPTIC** Permit #: **2014 - 950**

Private well to be installed prior to wastewater system installation.

Pin Number: 9493-69-2951

Date purchased: 7/10/2014

Expiration date: 7/10/2019

Applicant Name: **AAA Backhoe & Septic**

Zoning Permit Number 0

Site Address: 2507 Lakeview Dr Lot:
Fayetteville NC 28306-
Stoney Point

Directions:

Type of Establishment: Residential Design Flow 480 gpd Site Classification: Provisionally Suita

Repairs: 2 LINES @ 110' CONVENTIONAL, 12" MAX

WASTEWATER SYSTEM: The attached plot plan cannot be changed

Tank Capacity: 1000 gallons Pump tank reserve capacity: 1000 gallons

NITRIFICATION FIELD: Type: Other: No. Bedrooms: 3

No. Lines: Length of Each Line: Width of Each Line: Maximum Trench Bottom Depth:

Conditions: MOVE S/T& P/T TO COMPLY WITH SETBACKS DUE TO GARAGE ADDITION

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration

☐ Site Plan Provided - When a SITE PLAN is provided, the Improvement Permit is valid for five (5) years

Improvement Permit Expiration Date: _____

Improvement Permit Approved By: CELESTINE RAINERI CR Date: 7/10/2014

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastwater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

ATC Expiration Date: _____

ATC Approved By: CELESTINE RAINERI CR Date: 7/11/2014

OPERATIONS PERMIT

Contractor: _____ Pump Information: _____

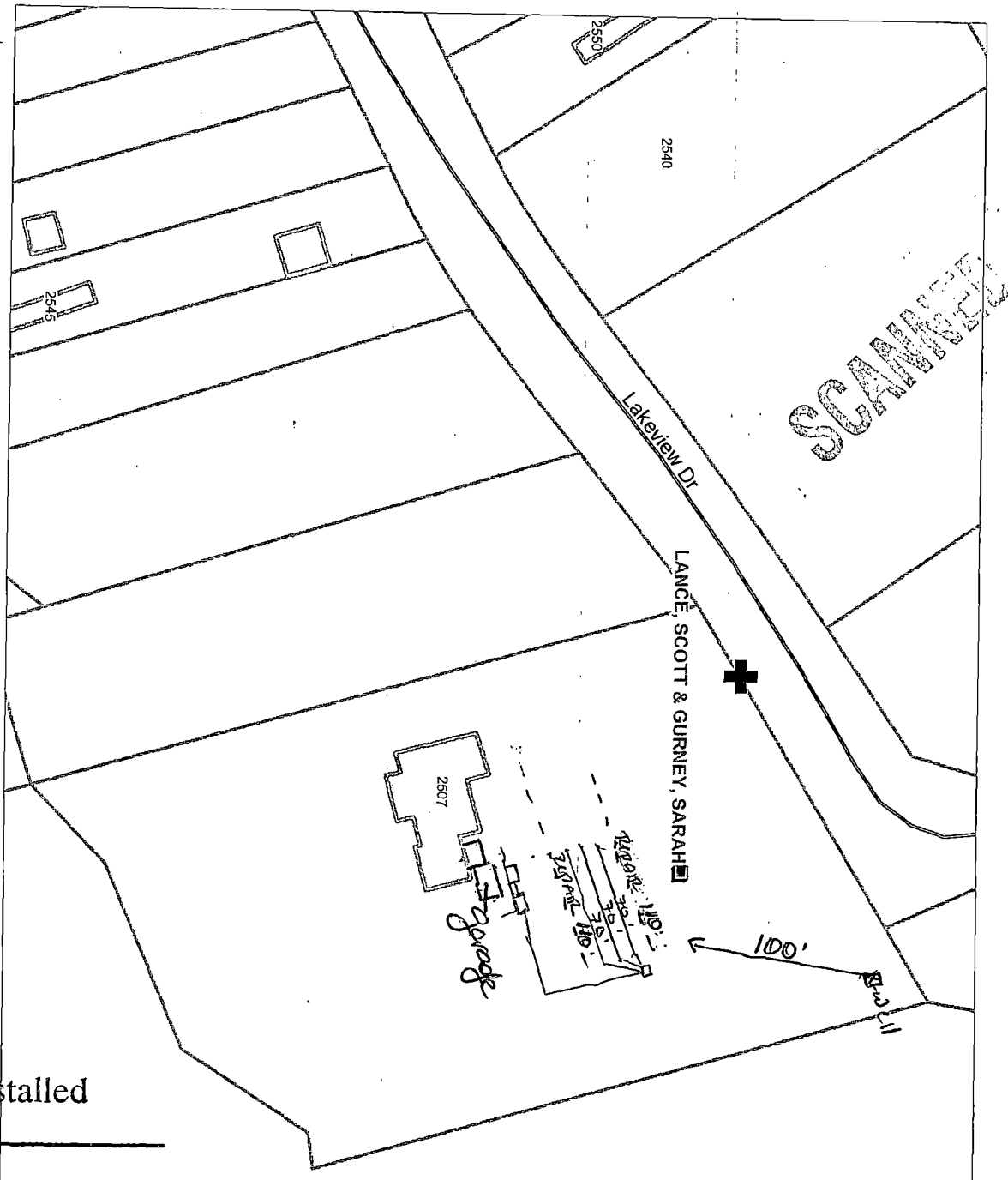
This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section .1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions

Operations Permit Approved By: _____ Date: _____

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6636

System Type_____ Manufacturer_____ Model_____

Tank Information_____



As Installed

Date: _____

Sanitarian: _____

Conventional Innovative

___ Septic Tank ___ Pump Tank

___ Drain lines ___ Length ___ Width

___ Trench depth max.

Comments Replace 3 move septic tank 3 pump tank to comply w/ new setbacks due to garage addition.

100 Scale

CALL NO CUTS
Before you dig
1-800-632-4949

Cumberland County Department of Public Health
227 Fountainhead Lane
Fayetteville NC 28301-5417
(910) 433-3660

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: 8/31/2009 **NEW SYSTEM/SOIL EVAL.** Permit #: **2009 - 1194**

Private well to be installed prior to wastewater system installation.

Pin Number: 9493-69-1976

Date purchased: 8/12/2009

Expiration date: 8/12/2014

Applicant Name: **Lance, Scott** Zoning Permit Number 0

Site Address: ~~2511~~ 3509 Lakeview Dr. Lot:

~~Hope Mills~~ Fay NC ~~28348~~ 28306

Subdivision:

Township:

Directions:

Type of Establishment: Residential Design Flow: 480 gpd Site Classification: Provisionally Suitab

Repairs: Pump to conventional sys.- 3 - 3' x 70' (6" of fill cover required.

WASTEWATER SYSTEM: The attached plot plan cannot be changed.

Tank Capacity: 1000 gallons Pump tank reserve capacity: 1000 gallons

NITRIFICATION FIELD: Type: ~~Serventional~~ Other Other: Rock or Tire chips ✓ No. Bedrooms: 4

No. Lines: 3 Length of Each Line: 70' Width of Each Line: 3' Maximum Trench Bottom Depth 12max

Conditions: Comply with attached conditions. Welll permit required. Tree removal required. Septic tank contractor must meet with inspector on-site before installation.

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration.

☑ Site Plan Provided - When a SITE PLAN is provided, the Improvement Permit is valid for five (5) years.

Improvement Permit Expiration Date: 8/28/2014

Improvement Permit Approved By: Ajmal Hashaam AAH Date: 8/28/2009

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

ATC Expiration Date: 8/31/2014

ATC Approved By: Ajmal Hashaam AAH Date: 8/31/2009

OPERATIONS PERMIT

Contractor: Cernas Septic ✓ Pump Information:

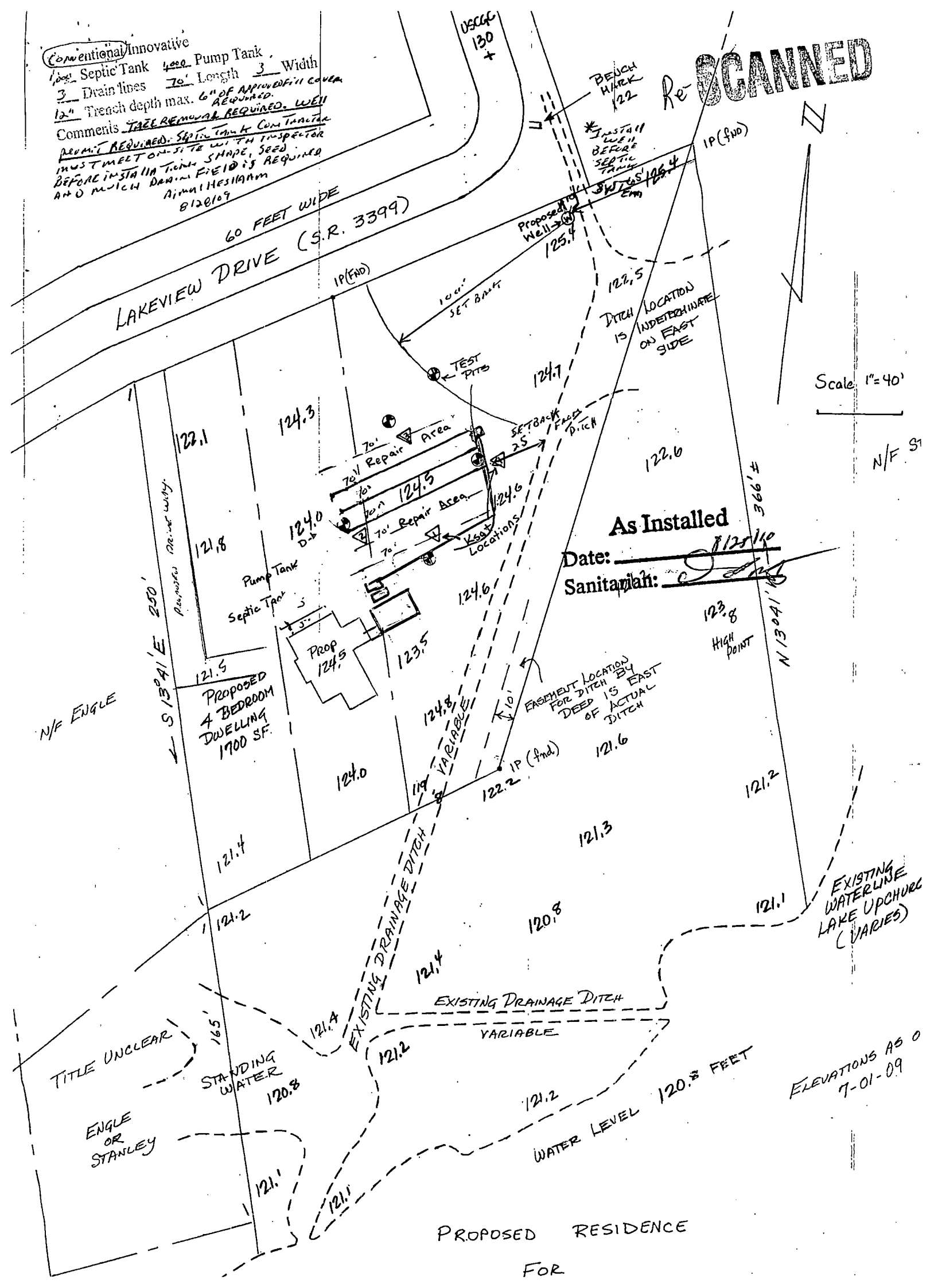
This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section .1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

Operations Permit Approved By: Date: 8/26/10 ✓

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6636

Precaps ✓ Septic Tank OK ✓
Drain Lines OK ✓
8/10/10
DO

8/31/2009 08:21 AM R-69


Conventional/Innovative
1,000 Septic Tank 1000 Pump Tank
3 Drain lines 70' Length 3' Width
12" Trench depth max. 6" OF APPROVED FILL COVER REQUIRED.
Comments TREE REMOVAL REQUIRED. WELL PERMIT REQUIRED. SEPTIC TANK COMPARTMENT MUST MEET ON-SITE WITH INSPECTOR BEFORE INSTALLATION. SHAPE, SEED AND MULCH DRAIN FIELD IS REQUIRED
Airun Heslamm
8/26/09
Re-SCANNED
60 FEET WIDE
LAKEVIEW DRIVE (S.R. 3399)
USGG 130 +
BENCH MARK 122
* INSTALL WELL BEFORE SEPTIC TANK
IP(FND)
Proposed Well
125.4
122.5
100' SET BACK
DITCH LOCATION INDETERMINATE ON EAST SIDE
TEST PITS
124.1
Scale 1"=40'
124.3
122.1
70' Repair Area
70' Repair Area
70' Repair Area
SETBACK FROM DITCH 25'
124.5
124.6
124.0 D-1
122.6
N/F ST
366'±
As Installed
Date: 8/25/10
Sanitarian:
Ksat Locations
Pump Tank
Septic Tank
121.8
PROPOSED 4 BEDROOM DWELLING 1700 SF.
PROP 124.5
123.5
124.6
123.8 HIGH POINT
N 13°41' W
S 13°41' E 250'
PROPOSED DRIVEWAY
121.5
N/F ENGLE
124.8
EASEMENT LOCATION FOR DITCH BY DEED IS EAST OF ACTUAL DITCH
10'
VARIABLE
IP (fnd)
122.2
121.6
124.0
119'
121.2
121.4
121.3
EXISTING DRAINAGE DITCH
120.8
EXISTING WATERLINE LAKE UPCHURCH (VARIES)
121.1
121.4
EXISTING DRAINAGE DITCH
VARIABLE
121.2
TITLE UNCLEAR
165'
STANDING WATER
120.8
ENGLE OR STANLEY
121.1
121.2
WATER LEVEL 120.8 FEET
ELEVATIONS AS O 7-01-09
121.1
PROPOSED RESIDENCE
FOR

Cumberland County Department of Public Health
130 Gillespie Street
Fayetteville NC 28301-5417
(910) 433-3668

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: **2/20/2012** **OCCUPANCY/CHANGE OF USE** Permit #: **2007 - 104**

Private well to be installed prior to wastewater system installation.

Pin Number: 9493-59-5529

Date purchased: 1/23/2007

Expiration date: 1/23/2012

Applicant Name: **BRYANT, ELLIF M.**

Zoning Permit Number 0

Site Address: 2583 Lakeview Drive ~~6240 WALDO'S BEACH RD~~ Lot:

Fayetteville NC 28306-

Subdivision:

Township:

Directions:

Type of Establishment: Residential Design Flow: 0 gpd Site Classification:

Repairs:

WASTEWATER SYSTEM: The attached plot plan cannot be changed.

Tank Capacity: gallons Pump tank reserve capacity: gallons

NITRIFICATION FIELD: Type: Conventional Other: No. Bedrooms: 3

No. Lines: Length of Each Line: Width of Each Line: Maximum Trench Bottom Depth

Conditions: TANK, DYBOX, DRAINLINE - APPROVED FOR OCCUPANCY

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration.

☐ Site Plan Provided - When a SITE PLAN is provided, the Improvement Permit is valid for five (5) years.

Improvement Permit Expiration Date: 2/16/2017

Improvement Permit Approved By: AJMAL HESHAAM Date: 2/16/2012

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

ATC Expiration Date: 2/20/2012

ATC Approved By: AJMAL HESHAAM Date: 2/20/2012

OPERATIONS PERMIT

Contractor: Pump Information:

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section .1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

Operations Permit Approved By: AJMAL HESHAAM AAH Date: 2/20/2012

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6636

SCANNED

2870

CUMBERLAND COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH
Phone (910) 433-3660 Permit No. 23649

IMPROVEMENT PERMIT

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Private well to be installed prior to wastewater system installation.

Property/Site Information:
PIN #: 00000 Township: LAKE UPCHURCH Zoning Permit: Z0000
0
Site Address: ~~2587 LAKEVIEW DRIVE~~ [redacted] RD,

Subdivision: LAKE UPCHURCH Lot #: SR:
Applicant: CASTLE, BOBBY ACCOUNT #:CAS6373
House [ ] Manufactured Home [X] Other (Specify)
Area #: 12
Design Daily Flow: 0
Site Classification:
Waste Water System: The attached plot plan cannot be changed.
Septic Tank 0 gallons Pump Tank 0 gallons
Nitrification Field:
Type: Conventional [X] Alternative: Specify:
No. of Bedrooms: 3
No. of Lines: 0 Length of Each Line: .00 Width of Each Line: 0
Maximum Trench Bottom Depth: :
Conditions: OKAY FOR BUILDING AS PLANNED.

Repair:type & amount

SITE PLAN: PLAT: RLS:
When a plat is provided the Improvement Permit is valid without expiration.
When a site plan is provided the Improvement Permit is valid for five (5) years.

IMPROVEMENT PERMIT EXPIRATION DATE:04/10/2005

IMPROVEMENT PERMIT BY: KAUFMAN, MARK DATE: 04/12/2000

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction, or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

EXPIRATION DATE:
APPROVED BY: Mark A Kauf DATE: 4-13-00

OPERATIONS PERMIT

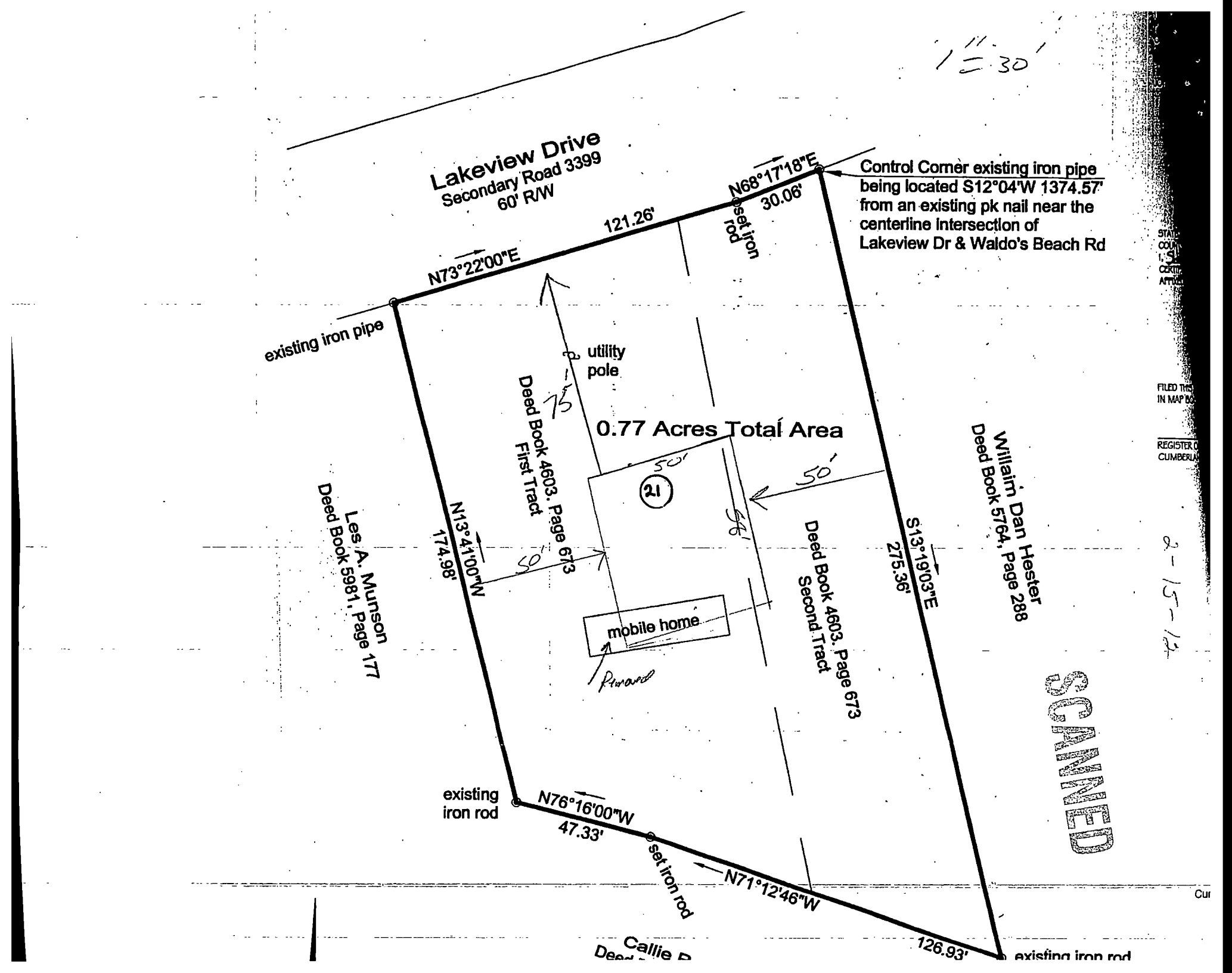
CONTRACTOR:

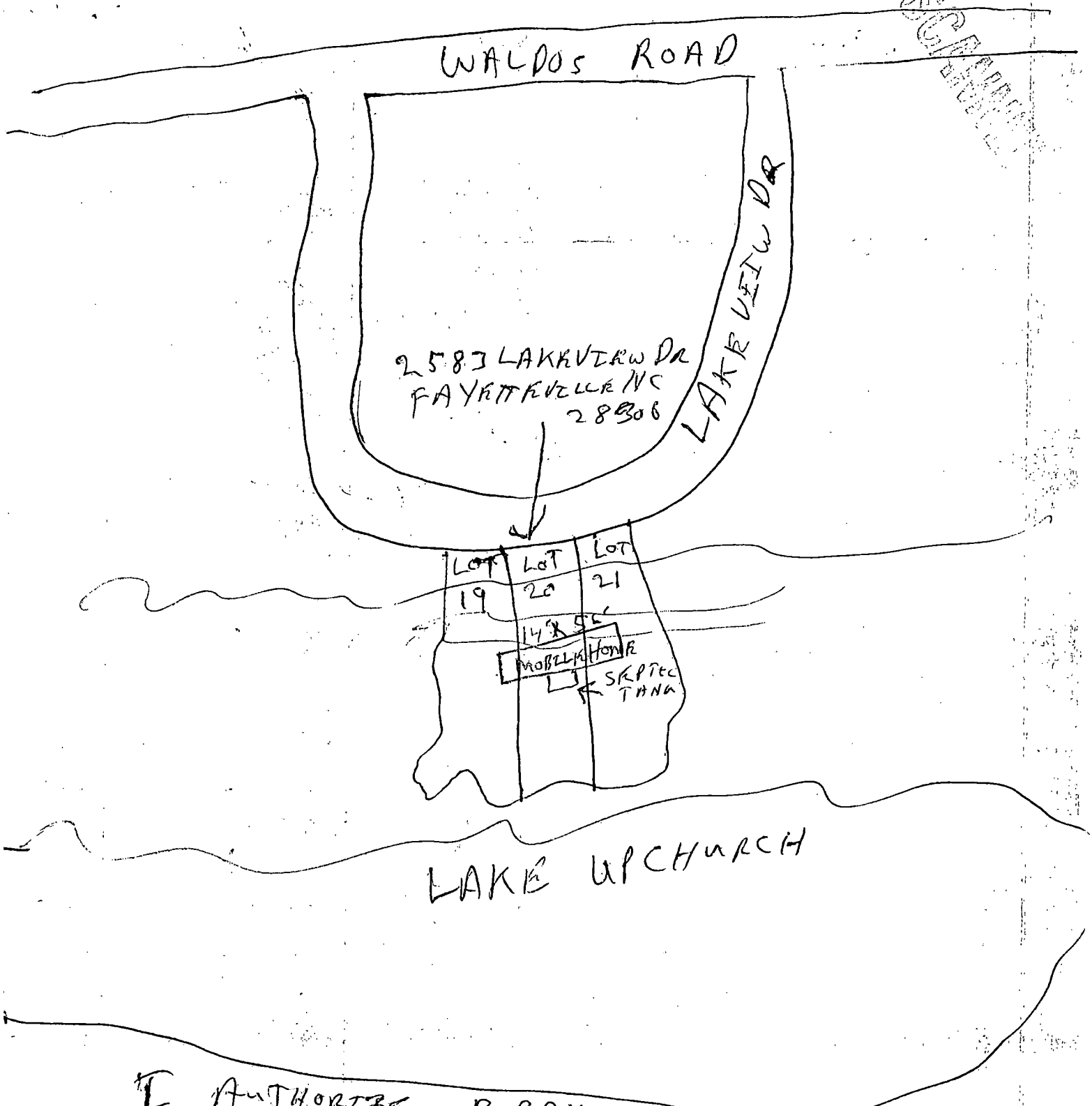
Pump Information:

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section. 1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment, and Disposal in Cumberland County,NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

APPROVED BY: Mark A. Kauf DATE: 4-13-00

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Department - Telephone (910)483-0113.


1" = 30'
Lakeview Drive
Secondary Road 3399
60' R/W
N68°17'18"E
30.06'
Control Corner existing iron pipe being located S12°04'W 1374.57' from an existing pk nail near the centerline intersection of Lakeview Dr & Waldo's Beach Rd
121.26'
N73°22'00"E
set iron rod
existing iron pipe
utility pole
Deed Book 4603, Page 673
First Tract
0.77 Acres Total Area
50'
21
50'
56'
Willaim Dan Hester
Deed Book 5764, Page 288
Les A. Munson
Deed Book 5981, Page 177
N13°41'00"W
174.98'
50'
S13°19'03"E
275.36'
Deed Book 4603, Page 673
Second Tract
mobile home
Forward
existing iron rod
N76°16'00"W
47.33'
set iron rod
N71°12'46"W
126.93'
existing iron rod
Callie P
SCANNED



I AUTHORIZE BOBBY CASTLE OWNER OF C&C CONSTRUCTION CO TO BUILD 20X20 STORAGE BUILDING ON MY PROPERTY AT 2583 LAKEVIEW DR FAYETTEVILLE NC 28306. NO ELECTRIC OR PLUMBING IS REQUIRED

Signed before me
04/05/00

My commission Expires
04/18/01

1324

CUMBERLAND COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH
Phone (910) 433-3660 Permit No. 22630

IMPROVEMENT PERMIT

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Private well to be installed prior to wastewater system installation.

Property/Site Information:
PIN #: 9493-59-3553 Township: HOPE MILLS Zoning Permit: Z0000
Site Address: 2595 LAKEWIVEW DR

Subdivision: WALDOS BEACH EST Lot #: 17-1 SR:
Applicant: MUNSON, LES ACCOUNT #:MUN5614
House [X] Manufactured Home [ ] Other (Specify)
Area #: 12
Design Daily Flow: 0
Site Classification:
Waste Water System: The attached plot plan cannot be changed.
Septic Tank 0 gallons Pump Tank 0 gallons
Nitrification Field:
Type: Conventional [X] Alternative: Specify:
No. of Bedrooms: 3
No. of Lines: 0 Length of Each Line: .00 Width of Each Line: 0
Maximum Trench Bottom Depth: :
Conditions: OK FOR REUSE OF SEPTIC TANK FOR A 3 BEDROOM HOUSE.

Repair:type & amount

SITE PLAN: PLAT: RLS: N
When a plat is provided the Improvement Permit is valid without expiration.
When a site plan is provided the Improvement Permit is valid for five (5) years.

IMPROVEMENT PERMIT EXPIRATION DATE:08/05/2004

IMPROVEMENT PERMIT BY: DANIEL ORTIZ, R.S. DATE: 08/09/1999

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction, or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

EXPIRATION DATE:
APPROVED BY: Daniel Ortiz, RS DATE: 8/9/99

OPERATIONS PERMIT

CONTRACTOR:

Pump Information:

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section. 1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment, and Disposal in Cumberland County,NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

APPROVED BY: DATE:

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Department - Telephone (910)483-0113.

Duplicate
DDS

CUMBERLAND COUNTY HEALTH DEPARTMENT
APPLICATION FOR PERMIT TO CONSTRUCT A WATER SUPPLY WELL

DATE: 17-Feb-04

PIN: 9493-59-3553

ADDRESS: 2595 LAKEVIEW DRIVE CITY HOPE MILLS, NC ZIP 28348

SUBDIVISION: LOT(S): SEC:

APPLICANT: CAPE FEAR WELL [X] Owner [ ] Builder [ ] Representative

MAILING ADDRESS: 2702 THROWER ROAD CITY HOPE MILLS, NC ZIP 28348

PERMIT TO CONSTRUCT

PERMIT ISSUED BY: DATE: 2/19/04

WELL GROUT

DRILLER: Cape Fear DATE: 2/19/04

GROUT DEPTH: 20 TYPE OF WELL: Deep

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL WATER SAMPLE. AN ACCEPTABLE BACTERIA ANALYSIS MUST BE RECEIVED BEFORE FINAL APPROVAL OF THIS WATER SUPPLY.

** OWNER OR WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3660 **

WELL GROUT APPROVED BY: DATE: 2/25/04

FINAL WELL APPROVAL

APPROVED BY: Ronald K Hall DATE: 17MAR04

NOTE:
WELL LOG AND BACTERIOLOGICAL SAMPLE ATTACHED

DDS

WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) James M. Bill CERTIFICATION # 2122

WELL CONTRACTOR COMPANY NAME Cape Fear Well & Pump PHONE # (910) 323-3411

STATE WELL CONSTRUCTION PERMIT# (if applicable) _____ ASSOCIATED WQ PERMIT# (if applicable) _____

1. WELL USE (Check Applicable Box): Residential ☑ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION: Nearest Town: Hope Mills County Cumberland
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting ☐Ridge ☐Slope ☐Valley ☑Flat (check appropriate box)

Latitude/longitude of well location _____ (degrees/minutes/seconds)

Latitude/longitude source: ☐GPS ☐Topographic map (check box)

3. OWNER: Lacy Wingo
Address 2595 Lake View Dr.
(Street or Route No.)
City or Town State Zip Code
( ) -
Area code- Phone number

4. DATE DRILLED 7-17-04
5. TOTAL DEPTH: 230
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☐
7. STATIC WATER LEVEL Below Top of Casing: 110 FT. (Use "+" If Above Top of Casing)
8. TOP OF CASING IS 1 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): 8 METHOD OF TEST Pump
10. WATER ZONES (depth): 190 - 212

DEPTH From	To	DRILLING LOG Formation Description
0	1	Top Soil
1	3	Yellow S
3	11	Brown SAC
11	13	Brown S
13	49	Brown SAC
49	190	Gray Coarse Brown SAC
190	212	Brown S Little C mixed
212	220	Brown State Rock

11. DISINFECTION: Type H TH Amount 100 PPM
12. CASING:

	Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
	0	192	Ft.	4"	40	PVC
	212	220	Ft.	4"	40	PVC
			Ft.			

13. GROUT:

Depth From	To	Ft.	Material	Method
0	20'	Ft.	Cement	Poured
		Ft.		

14. SCREEN:

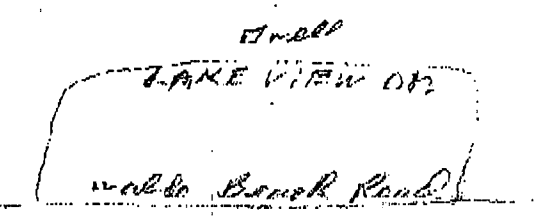
Depth From	To	Ft.	Diameter	Slot Size	Material
192	212	Ft.	4" in.	18 in.	PVC
		Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Ft.	Size	Material
187	220	Ft.	78 M	Pea Gravel
		Ft.		

LOCATION SKETCH

Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.



16. REMARKS: _____

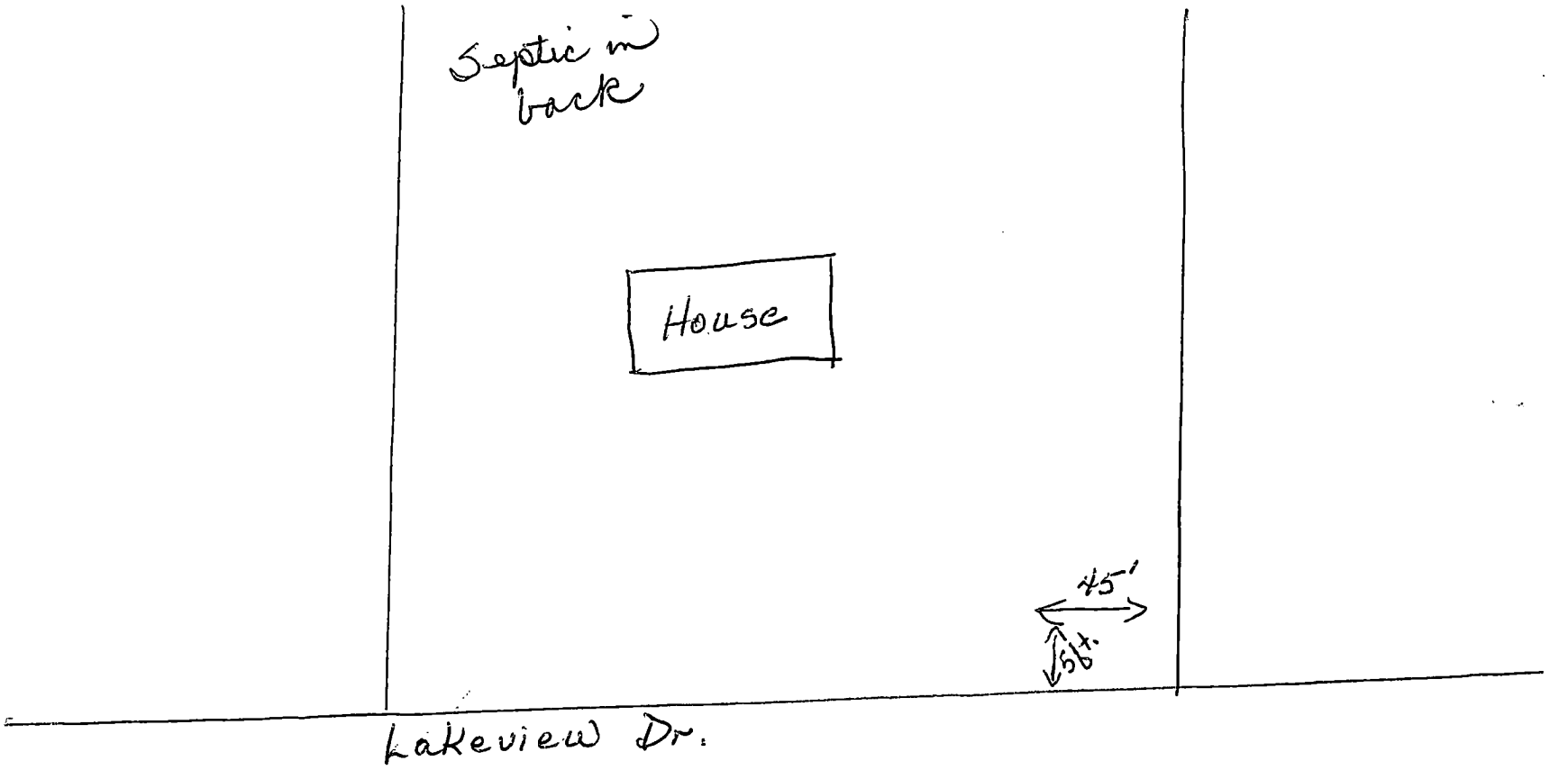
I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

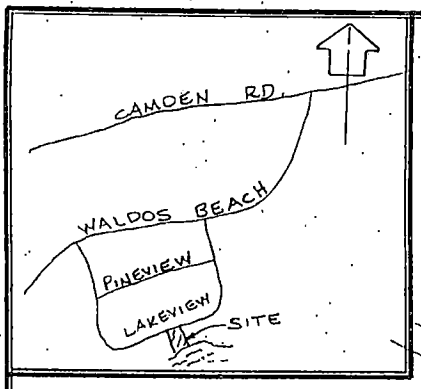
SIGNATURE OF PERSON CONSTRUCTING THE WELL — DATE 7/20/04

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC

GW-1 REV 07/2001

Les Munson
2595 Lakeview Dr.
Fayetteville, N.C. 28306





VICINITY MAP – N.T.S.

NOTE:
This property is located in Zone "A3", (100-yr) Flood Hazard Area, per Flood Insurance Rate Map, Community Panel Number 370076 0185 B, Panel 185 of 295.

DB. 2634 PG. 317
1977

LAKE UPCHURCH

PIER

S 76°-16' E
56.33'

24.17'

8.5'

8.7'

16'

STORAGES

S 36°-8' E

(18)

N 13°-41' W
163.36'

N 13°-41' W - 174.94'

(19)

(17)

PROPOSED DINING ROOM

15'

35'-10"

WIRE FENCE

(16)

PROPOSED HOME

EXISTING HOME

38'

14'

18'

26'

36'

15' Side Setback Required

S 13°-41' E - 147.00'

DRIVE

58'

WELL

4'

4.7'

7.30'

44.78'

S 73°-22' W

N 83°-41' W

53.21'

LAKEVIEW DRIVE
60' R/W

PLOT PLAN

OWNERS: LES MUNSON

SUBDIVISION: WALDO BEACH ESTATES SECTON D

PLAT BOOK UNRECORDED PAGE
DEED BOOK 2634 PAGE 317
LOT 17 & 18
PIN 9493.07-59-3553

DATE SURVEYED 8-4-99

FAYETTEVILLE CUMBERLAND COUNTY NORTH CAROLINA

HOUSE NUMBER 2595

TOWNSHIP Rockfish

SCALE: 1" = 30'

BAR GRAPH: (IN FEET) 30 15 0 30

NOTE:
This is a Drawing Only, copied from a Plat or Deed, not an actual

LEGEND:

D85

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2007	1794			Date:	10/10/2007
PIN:	9493-59-3610				
Address	2603 Lakeview Drive	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	Cape Fear Well & Pump Co.	Applicant Type	Contractor / Builder		
Mailing Address:	2702 Thrower Road	City	Hope Mills	Zip	28348-

Permit To Construct

Permit Issued By [signature] Date: 10/15/07

See Attached Site Plan 50' min From Septic & 25' Min Building Foundation

Well Grout

Driller: Cape Fear Date: 11/20/07

Grout Depth 0 Ft 20 Type Of Well: Drilled

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL WATER SAMPLE. AN ACCEPTABLE BACTERIA ANALYSIS MUST BE RECEIVED BEFORE FINAL APPROVAL OF THIS WATER SUPPLY.

****OWNER OF WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3660****

Well Grout Approved By: [signature] Date: 11/20/07

FINAL WELL APPROVAL

Final Well Approved By: Date:

NOTE: WELL LOG AND BACTERIOLOGICAL SAMPLE ATTACHED

Other Information:

D22

Cumberland County Department of Public Health

Permit to Construct a Water Supply Well

2007	1105			Date:	6/12/2007
PIN:	9493-59-1589				
Address	2619 LAKEVIEW DR.	City	Fayetteville	Zip	28306-
Subdivision:		Lot(s)		Section	
Applicant:	ELLIS E. EHLE JR.	Applicant Type	Owner		
Mailing Address:	2619 LAKEVIEW DR.	City	Fayetteville	Zip	28306-

Permit To Construct

Permit Issued By [signature] **Date:** 6/14/07

See Attached Site Plan

Well Grout

Driller: Cape Fear well **Date:** 7/9/07

Grout Depth 0 Ft 20 **Type Of Well:** Drilled

NOTE TO OWNER: INCLUDES ONE (1) BACTERIOLOGICAL WATER SAMPLE. AN ACCEPTABLE BACTERIA ANALYSIS MUST BE RECEIVED BEFORE FINAL APPROVAL OF THIS WATER SUPPLY.

*****OWNER OF WELL DRILLER MUST CALL FOR WATER SAMPLE 433-3660*****

Well Grout Approved By: [signature] **Date:** 7/9/07

FINAL WELL APPROVAL

Final Well Approved By: **Date:**

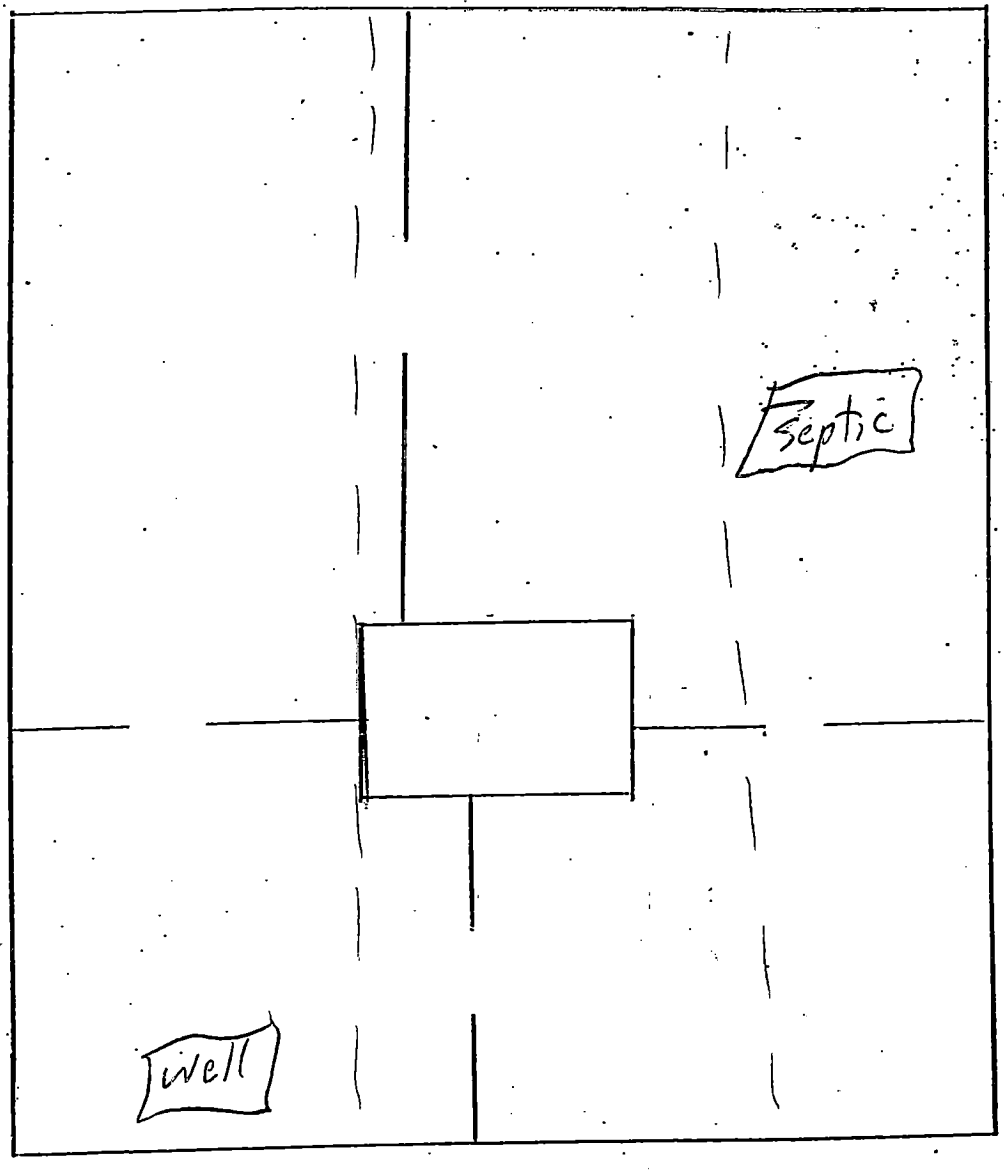
NOTE: WELL LOG AND BACTERIOLOGICAL SAMPLE ATTACHED

Other Information:

Bact. H2O sample collected 7/16/07 - MM

Scale 1"-40'
lot # ___ -
Sq ft-house ___ -
Addon ___ ---

Septic



well

DPS

Cumberland County Public Health Department
227 Fountainhead Lane
Fayetteville NC 28301-
(910) 433-3660

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: **1/20/2004** **INSPECT-EXISTING SYSTEM** Permit #: **2004 - 45**

Private well to be installed prior to wastewater system installation.

Pin Number: 9493-49-9524

Date purchased: 1/12/2004

Expiration date: 1/12/2009

Applicant Name: **ROSINA RAUER NEWTON**

Zoning Permit Number 0

Site Address: 2643 LAKEVIEW DRIVE Lot:
Fayetteville NC 28306-

Subdivision:

Township:

Directions:

Type of Establishment: Residential Design Flow: 480 gpd Site Classification: Provisionally Suita

Repairs:

WASTEWATER SYSTEM: The attached plot plan cannot be changed.

Tank Capacity: 0 gallons Pump tank reserve capacity: 0 gallons

NITRIFICATION FIELD: Type: Conventional Other: No. Bedrooms: 4

No. Lines: 1 Length of Each Line: 100 Width of Each Line: 6 Maximum Trench Bottom Depth: 18-24

Conditions: EXISTING SEPTIC TANK OK

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration.

☐ Site Plan Provided - When a SITE PLAN is provided, the Improvement Permit is valid for five (5) years.

Improvement Permit Expiration Date: _____

Improvement Permit Approved By: DANIEL ORTIZ Date: 1/16/2004

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastwater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

ATC Expiration Date: _____

ATC Approved By: DANIEL ORTIZ Date: 1/16/2004

OPERATIONS PERMIT

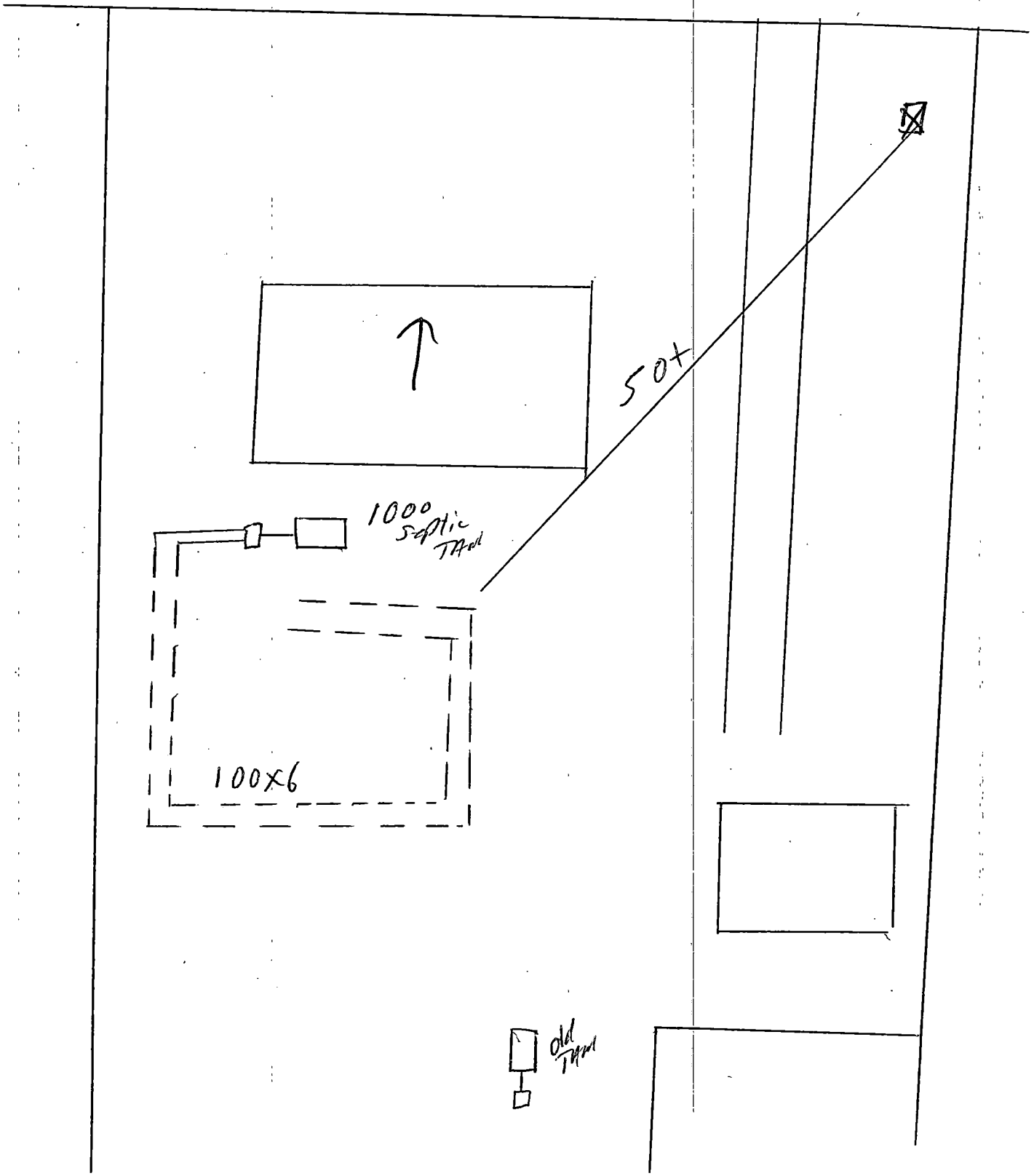
Contractor: CJC Pump Information: _____

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section .1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

Operations Permit Approved By: _____ Date: 1/22/04

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6636

Conventional
1000g Septic Tank
1 Line at 100x6
D-Box
T & Filter



[redacted]

Cumberland County Department of Public Health
130 Gillespie Street
Fayetteville NC 28301-5417
(910) 433-3660

SCANNED

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: **10/2/2014** **SEP SYS EXPAN W/POOL/ROOM** Permit #: **2014 - 1234**

Private well to be installed prior to wastewater system installation.

Pin Number 9493-49-7583

Date purchased 10/1/2014

Expiration date 10/1/2019

Applicant Name **Bryant, Bryan**

Zoning Permit Number 0

Site Address 2659 Lakeview Dr Lot 4 5
Fayetteville NC 28306

Directions

Type of Establishment Residential Design Flow 480 gpd Site Classification Provisionally Suita

Repairs

WASTEWATER SYSTEM The attached plot plan cannot be changed

Tank Capacity gallons Pump tank reserve capacity gallons

NITRIFICATION FIELD Type Innovative Other 25% Reduction No Bedrooms 4

No Lines 1 Length of Each Line 100' Width of Each Line 3' Maximum Trench Bottom Depth 18"

Conditions Install at least 100' of drain line Comply with attached conditions

GRADE TRENCH BOTTOM NEW DOC

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration.

☑ Site Plan Provided - When a SITE PLAN is provided, the improvement Permit is valid for five (5) years.

Improvement Permit Expiration Date 10/2/2019

Improvement Permit Approved By Ajmal Hesnaam AAH Date: 10/2/2014

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC) EXISTING DRAIN

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued. LINE (2) CONNECTED

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS

ATC Expiration Date 10/2/2019

ATC Approved By Ajmal Hesnaam AHH Date: 10/2/2014

OPERATIONS PERMIT

Contractor D. C. CARTER Pump Information

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A Section .1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC", however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

Operations Permit Approved By Ajmal Hesnaam Date 10/8/14

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6636

System Type BG Manufacturer INFILTRATOR Model E-Z FLOW

Tank Information EXISTING

POLY LOK EFFLUENT INSTALLED

10/2/2014 11:44:AM R-80

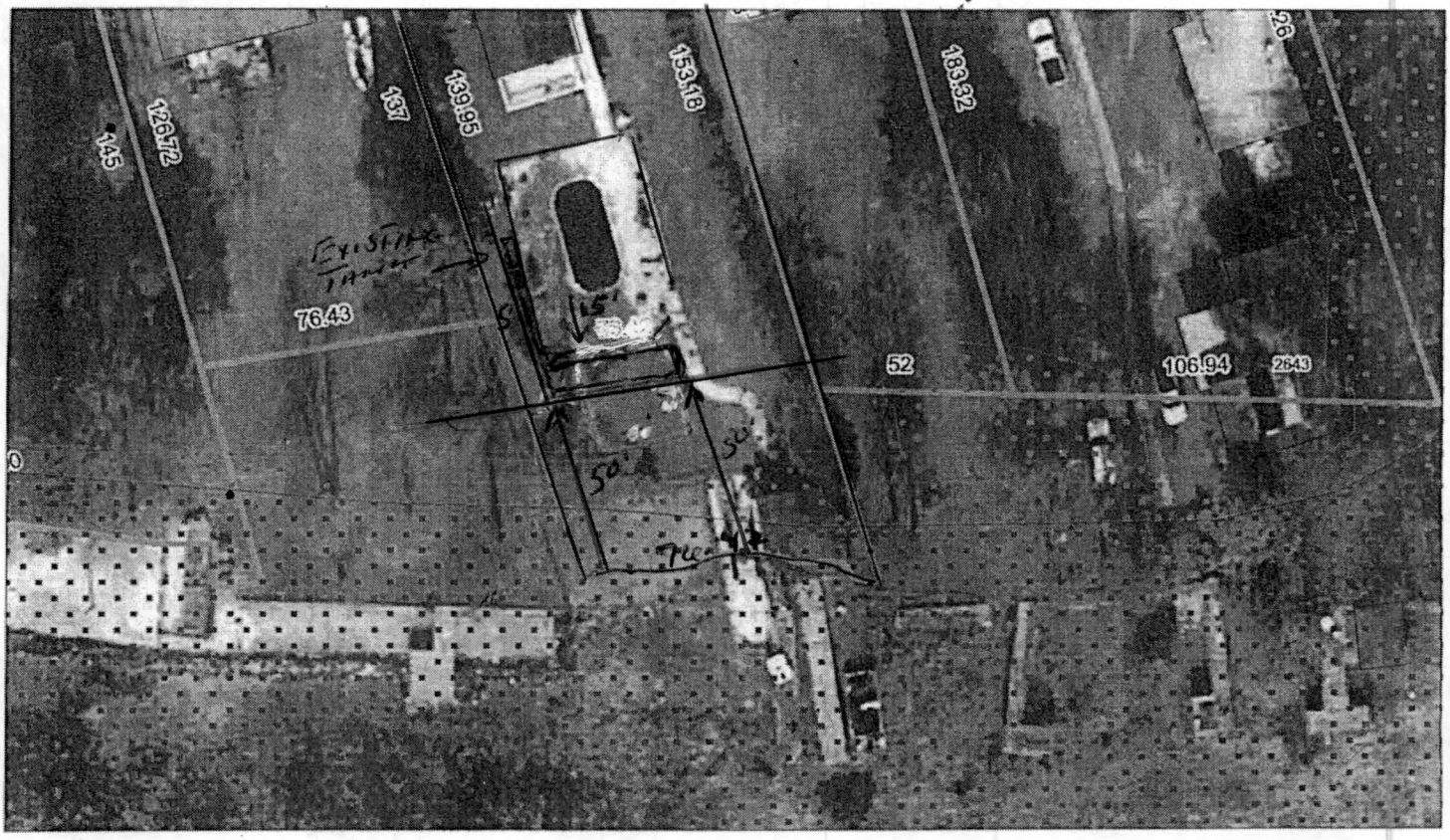
25% REDUCTION

NOTE: THERE ARE TWO EXISTING DRAIN LINES.

Conventional Innovative
Existing Septic Tank ___ Pump Tank
1 Drain lines 100' Length 3' Width
18" Trench depth max.
Comments INSTALL EFFLUENT AND NEW D-BOX.

AS BUILT (LESS 15)
ADAM HESHMATI
10/18/14

1" = 50'



Per Conversation w/ Phil Smith 8/28/09

Rear Property Line Extended To Correspond w/ High Water Mark Per Original Deed.

Ken Lyle
8/28/09

As Installed
Date: 10/18/14
Sanitarian: ADAM HESHMATI
E-Z Flow Installed

C1301
CD43 5

77 74
7 10

SCANNED

CUMBERLAND COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
227 Fountainhead Lane
Fayetteville, NC 28301
Phone (919) 433-3660

(SEPTIC TANK) IMPROVEMENTS PERMIT AND CERTIFICATE OF COMPLETION

PERMIT VALID FOR 60 MONTHS FROM DATE OF ISSUANCE. DATE: 06/24/93

OWNER/OCCUPANT KING, W. R. PERMIT NO. 8824

ADDRESS RT. 12, BOX 624 INSP.START DT: 06/30/93
INSP.COMP. DT: 12/01/93

FAYETTEVILLE NC 28306

ACCOUNT NUMBER: 1182

REMARKS

LOCATION LOT 7, SAVANNAH DRIVE

S.R.NO.
SUBDIVISION NAME KINGS LAKE PIN NO. 9484-67-2351

HOUSE [X] MOBILE HOME [ ] BUSINESS [ ] OTHER [ ]
NO.BEDROOMS/FLOW 3
Soil Group LOAM
Seasonal Water Table PROVISIONALLY SUITABLE
Site Classification PROVISIONALLY SUITABLE
NEW/EXISTING PLOT PLAN
Size of Septic Tank 1000 Gal.
Nitrification Lines 750.00 sq.ft.
No. of Lines 3X84X3'
Water Supply: Installed Yes Approved Yes
No X No
Repair Lines/Length

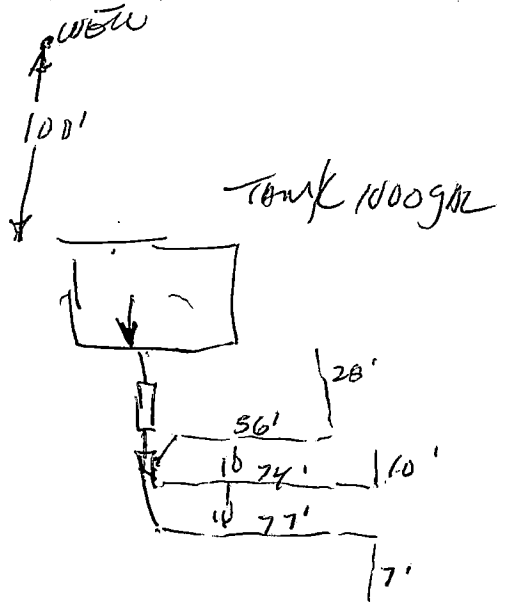
WELL MUST BE INSTALLED BEFORE SEWAGE SYSTEM.
ALL PARTS OF SEWAGE SYSTEM MUST BE AT LEAST 100 ' FROM ANY WELL.

ENV.HLTH.SPECIALIST: DANNY SOLES, R.S.

THE LAYOUT, PROPOSED BY THE OWNER TO REPAIR OR TO PROVIDE THE SEPTIC TANK SYSTEM, APPEARS TO CONFORM TO THE PROVISIONS OF THE CUMBERLAND COUNTY BOARD OF HEALTH SEWAGE REGULATIONS.

INSTALLED BY: Franklin Jones

THIS PERMIT IN NO WAY GUARANTEES THE PERFORMANCE OR FUNCTIONING OF THIS SEWAGE DISPOSAL SYSTEM.



CERTIFICATE OF COMPLETION BY Melinda Oliver DATE 12-01-93

Pursuant to Article 11 of Chapter 130A of the General Statutes of North Carolina, "Sanitary Sewage Systems", and Sanitary Collection, Treatment, and Disposal Systems Rules 10 NCAC 10A Section. 1900 and Cumberland County Board of Health regulations governing same.

REMARKS: 18" TO TRENCH BOTTOM MAX. SEE PLOT PLAN.

f

NOTE:
CEMENT FLOORED PATIOS AND SIMILAR AREAS, ETC. ARE NOT TO BE INSTALLED OVER ANY PORTION OF SEWAGE DISPOSAL SYSTEM TO INCLUDE SEPTIC TANK.

LAYOUT FOR PROPOSED
Individual Water Supply &
Sewage Disposal System
APPROVED

James B. Stevens R.S.
Environmental Health Supervisor
Cumberland County Health Department
Fayetteville, North Carolina
DATE 7-2-93

SEWAGE DISPOSAL INFORMATION
B.R. 3 Baths 3 Class. RS
S.L. By: D.Sales Soil Type Loam Limit 3 @ 8"
S.A.R. Dir. 250sf F/Br. 1000 gpd Repair Area 2@100'
Tank Cap. 1000 gpd
Location of System
System Drawn By
Yes
No Date
Approved By DPH 7-1-93
Fee Paid: 54

SALANIATY 60' R/W DRIVE

(±174)
N 61° 33' 36" E 175.06'
E=543.7, L=141.10
(±169)
Repair Area
LOT 7
(PROPOSED F.F.E. 172')
Repair Area
Repair Area
(±157)
PROPOSED 1½ STORY H.
DECK
PROPOSED DRIVE
S 43° 17' 22" E 18.36'
(±178)
APP. LOC. OF FLOOD PLAIN (L)
100' OF FLOOD PLAIN (OUT)
S 57° 18' 39" W 150.08'
Well
N 64° 30' W 175.0'
S 6
(±160)

Note: Front yard shall be graded such that system can be installed without stepdowns and such that the nitrification lines are no deeper than 18 inches (to bottom of trench) Finished floor elevation shall be high enough to allow gravity flow to shallow nitrification lines. Otherwise will require a sewage lift pump, pump tank, and other appurtenances.

REFERENCE:
PLAT BOOK 65, PAGE 67
CUMBERLAND CO. REGISTRY

PLAT OF
LOT No. 7, KINGS LAKE
PHASE ONE
ROCKFISH TOWNSHIP, CUMBERLAND COUNTY
NORTH CAROLINA

SCALE: 1" = 50'

STROTHER LAND SURVEYING
LELAND D. STROTHER, R.L.S. L-2768
120 EAST ELWOOD AVENUE
RAEFORD, NORTH CAROLINA
PHONE: (919) 875-8081

Cumberland County Department of Public Health
130 Gillespie Street
Fayetteville NC 28301-5417
(910) 433-3668

RESCANNED

Improvement Permit

This permit is subject to revocation if the site plan or plat, whichever is applicable, or the intended use changes.

Date: **1/26/2018** **REPAIR PERMIT SEPTIC** Permit #: **2018 - 67**

Private well to be installed prior to wastewater system installation.

Pin Number: 9493-39-9936

Date purchased: 1/23/2018

Expiration date: 1/23/2023

Applicant Name: **JONES SEPTIC TANK SERVICE**

Zoning Permit Number: 0

Max Occupancy: 6

Site Address: 6663 WALDOS BEACH ROAD Lot:
Fayetteville NC 28306-

Directions:

Type of Establishment: Residential Design Flow: 360 gpd Site Classification: Provisionally Suita

Repairs.

WASTEWATER SYSTEM: The attached plot plan cannot be changed.

Tank Capacity: gallons Pump tank reserve capacity: gallons

NITRIFICATION FIELD: Type: Innovative Other: 25% REDUCTION No. Bedrooms: 3

No. Lines: 1 Length of Each Line: 128' Width of Each Line: 3' Maximum Trench Bottom Depth: 36MAX

Conditions: REPLACE TEE. DO NOT EXCEED 36" MTD. STAY 50' FROM ANY WELL.

New tee ✓

13
12
8

☐ Plat Provided - When a PLAT is provided, the Improvement Permit is valid without expiration.

☐ Site Plan Provided - When a SITE PLAN is provided, the Improvement Permit is valid for five (5) years

Improvement Permit Expiration Date:

Improvement Permit Approved By: CELESTINE RAINERI CR Date: 1/25/2018

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION (ATC)

An Authorization for Wastewater System Construction is required before any person shall commence or assist in the installation, construction or repair of a wastewater system and before any other permits (electrical, plumbing, heating, air conditioning or other construction) can be issued.

AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION IS VALID FOR FIVE (5) YEARS.

ATC Expiration Date:

ATC Approved By: CELESTINE RAINERI CR Date: 1/25/2018

OPERATIONS PERMIT

Contractor: Jones Pump Information: 71

This septic tank and this nitrification field have been inspected and meet the requirements as set forth by Article 11 of Chapter 130A of the General Statutes of North Carolina, "Wastewater Systems" "Laws and Rules for Sewage Treatment and Disposal Systems" Title 10 NCAC, Subchapter 10A, Section 1900 and "Regulations Governing Sanitary Sewage, Collection, Treatment and Disposal in Cumberland County, NC"; however, the signing of this form in no way guarantees the life of the system or that it will function under any or all conditions.

Operations Permit Approved By: Celestine Raineri CR Date: 2-6-18

Inspection of sewer line between house and septic tank connection thereto is the responsibility of Cumberland County Inspection Dept. (910) 321-6626

System Type: Approved Manufacturer: Infiltrator Model: 104

Tank Information:

Approved

Conventional Innovative

___ Septic Tank ___ Pump Tank

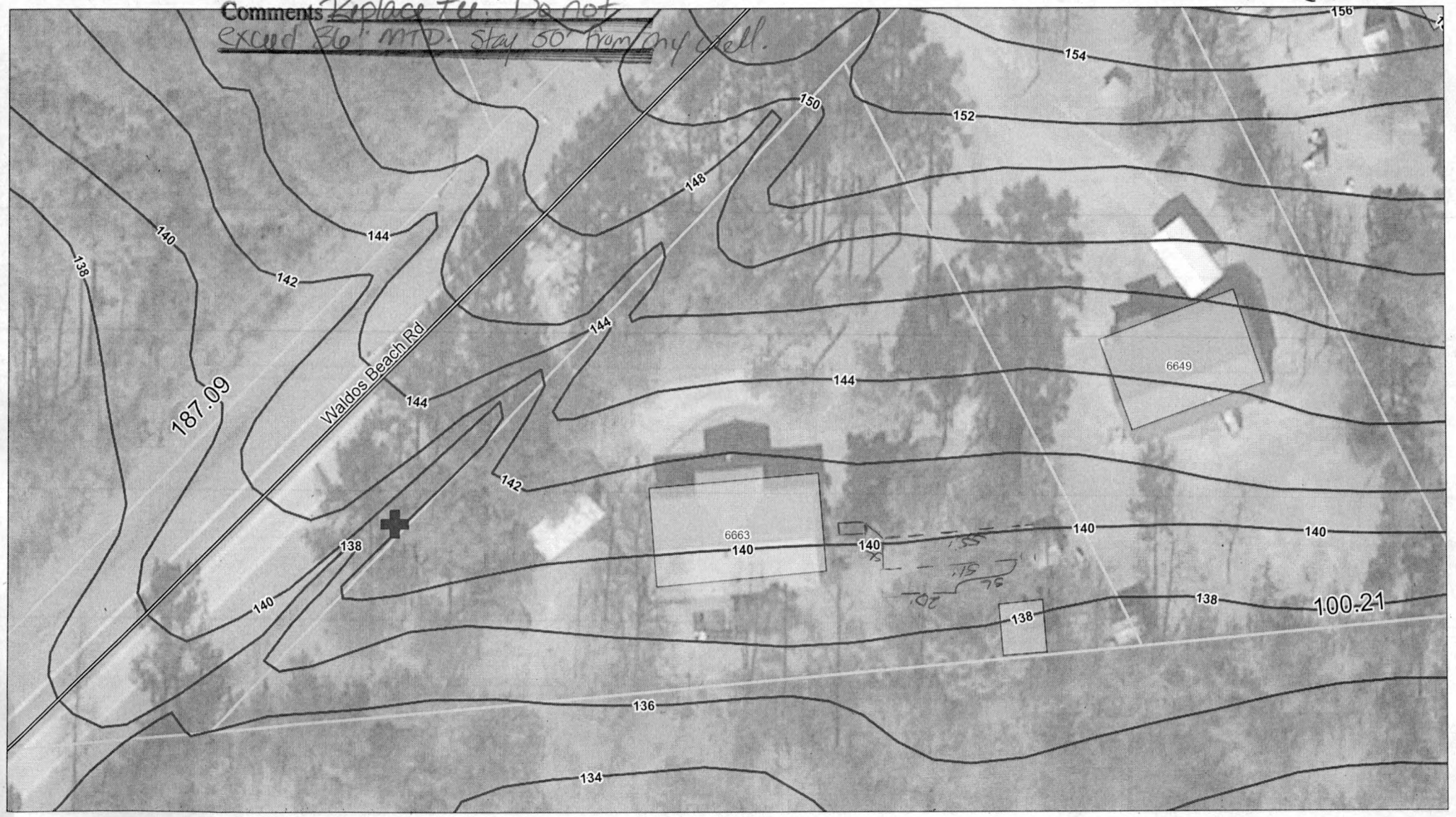
1 Drain lines 128' Length 3' Width

36" Trench depth

Comments Replace fu. Do not exceed 36" MTD. Stay 50' from any well.

RE SCANNED

40 scale



CALL NO CUTS
Before you dig
1-800-632-4949

As Installed
Date: 2-6-18
Sanitarian:

Appendix G
Well Abandonment Guidelines and Records; and Well Construction Standards

WELL ABANDONMENT RECORD

For Internal Use ONLY:

1. Well Contractor Information:

Well Contractor Name (or well owner personally abandoning well on his/her property)

NC Well Contractor Certification Number

Company Name

2. Well Construction Permit #: _____
List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.) if known

3. Well use (check well use):

Water Supply Well:	
☐Agricultural	☐Municipal/Public
☐Geothermal (Heating/Cooling Supply)	☐Residential Water Supply (single)
☐Industrial/Commercial	☐Residential Water Supply (shared)
☐Irrigation	
Non-Water Supply Well:	
☐Monitoring	☐Recovery
Injection Well:	
☐Aquifer Recharge	☐Groundwater Remediation
☐Aquifer Storage and Recovery	☐Salinity Barrier
☐Aquifer Test	☐Stormwater Drainage
☐Experimental Technology	☐Subsidence Control
☐Geothermal (Closed Loop)	☐Tracer
☐Geothermal (Heating/Cooling Return)	☐Other (explain under 7g)

4. Date well(s) abandoned: _____

5a. Well location:

Facility/Owner Name

Facility ID# (if applicable)

Physical Address, City, and Zip

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

_____ **N** _____ **W**

CONSTRUCTION DETAILS OF WELL(S) BEING ABANDONED
*Attach well construction record(s) if available. For multiple injection or non-water supply wells **ONLY** with the same construction/abandonment, you can submit one form.*

6a. Well ID#: _____

6b. Total well depth: _____**(ft.)**

6c. Borehole diameter: _____**(in.)**

6d. Water level below ground surface: _____**(ft.)**

6e. Outer casing length (if known): _____**(ft.)**

6f. Inner casing/tubing length (if known): _____**(ft.)**

6g. Screen length (if known): _____**(ft.)**

WELL ABANDONMENT DETAILS

7a. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same well construction/depth, only 1 GW-30 is needed. Indicate TOTAL NUMBER of wells abandoned: _____

7b. Approximate volume of water remaining in well(s): _____**(gal.)**

FOR WATER SUPPLY WELLS ONLY:

7c. Type of disinfectant used: _____

7d. Amount of disinfectant used: _____

7e. Sealing materials used (check all that apply):

☐ Neat Cement Grout	☐ Bentonite Chips or Pellets
☐ Sand Cement Grout	☐ Dry Clay
☐ Concrete Grout	☐ Drill Cuttings
☐ Specialty Grout	☐ Gravel
☐ Bentonite Slurry	☐ Other (explain under 7g)

7f. For each material selected above, provide amount of materials used:

_____ _____

_____ _____

7g. Provide a brief description of the abandonment procedure:

_____

_____

_____

_____

8. Certification:

Signature of Certified Well Contractor or Well Owner

Date

By signing this form, I hereby certify that the well(s) was (were) abandoned in accordance with 15A NCAC 02C .0100 or 2C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

9. Site diagram or additional well details:
You may use the back of this page to provide additional well site details or well abandonment details. You may also attach additional pages if necessary.

SUBMITTAL INSTRUCTIONS

10a. For All Wells: Submit this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Information Processing Unit,
1617 Mail Service Center, Raleigh, NC 27699-1617

10b. For Injection Wells: In addition to sending the form to the address in 10a above, also submit one copy of this form within 30 days of completion of well abandonment to the following:

Division of Water Resources, Underground Injection Control Program,
1636 Mail Service Center, Raleigh, NC 27699-1636

10c. For Water Supply & Injection Wells: In addition to sending the form to the address(es) above, also submit one copy of this form within 30 days of completion of well abandonment to the county health department of the county where abandoned.

CONTACT INFORMATION

If you have any questions about abandoning your well, please call your regional DENR Aquifer Protection Section for more information.

Asheville Regional Office
2090 U.S. Highway 70
Swannanoa, NC 28778
Phone: (828) 296-4500

Fayetteville Regional Office
225 Green Street, Suite 714
Fayetteville, NC 28301-5043
Phone: (910) 433-3300

Mooresville Regional Office
610 East Center Avenue, Suite 301
Mooresville, NC 28115
Phone: (704) 663-1699

Raleigh Regional Office
3800 Barrett Drive
Raleigh, NC 27609
Phone: (919) 791-4200

Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
Phone: (252) 946-6481

Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, NC 28405-2845
Phone: (910) 796-7215

Winston-Salem Regional Office
585 Waughtown Street
Winston-Salem, NC 27107
Phone: (336) 771-5000

North Carolina

WELL

ABANDONMENT

Presented by:
Division of Water Quality
Aquifer Protection Section

NCDENR

Responsibility for Well Abandonment

A well must be permanently abandoned or repaired if it acts as a source or channel of contamination. If a well is required to be abandoned, the well owner is responsible for having the well permanently abandoned except in the following situations:

(1) the well contractor is responsible for well abandonment if abandonment is required because the well contractor improperly locates, constructs, repairs, or completes the well; and

(2) the person who installs, repairs, or removes the well pump is responsible for well abandonment if that abandonment is required because of improper well pump installation, repair, or removal.

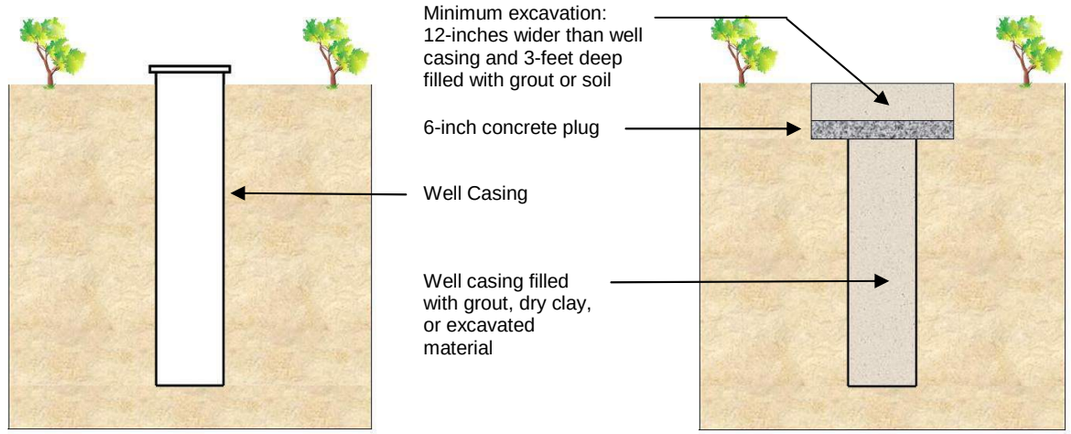
Any person abandoning a well must submit a record of abandonment (form GW-30) to the Division of Water Quality within 30 days after completion.

There are two major categories of wells: Drilled and Bored.

1) Drilled Wells are usually 2-10 inches in diameter, have steel or thermoplastic casing and are typically “punched” or drilled into unconsolidated sediments or consolidated bedrock.

2) Bored Wells are usually 18-36 inches in diameter, have clay or concrete casings and usually are hand dug, or bored with a large diameter power auger into unconsolidated sediments or weathered bedrock. The requirements for well abandonment are different for these two well types.

Bored Well Abandonment Example:



Bored Well Abandonment

The following is the generalized process for abandoning bored wells:

1) The well should be disinfected in accordance with the procedures found in Title 15A NCAC 02C .0111.

2) Remove all plumbing or piping, along with any obstructions in the well.

3) Remove as much of the well casing as possible, but no less than 3 feet below land surface.

4) Remove all soil or other subsurface material present down to the top of the remaining well casing and extending to a width of at least 12 inches outside of the well casing;

5) Fill the entire well up to land surface with grout, dry clay, or material excavated during construction of the well. If dry clay or material excavated during the construction of the well is used, it shall be emplaced in lifts no more than 5 feet thick and then compacted in place prior to emplacement of the next lift.

6) Pour a 6-inch concrete plug that covers the entire excavated area above the top of the casing, including the area extending on all sides of the casing out to a width of at least 12 inches on all sides.

7) Complete the abandonment process by filling the remainder of the well above the plug with additional grout or soil.

Drilled Well Abandonment

Any casing not grouted must be removed or properly grouted. Casing that is grouted can be removed if such removal does not contribute to contamination of the groundwater.

The entire depth of the well has to be sounded to ensure freedom from obstructions that may interfere with sealing operations.

The well should be disinfected using a solution made from calcium hypochlorite containing 65% - 75% available chlorine, such as HTH. Do not use calcium hypochlorite products containing fungicides, algicides, or other disinfectants. Do not use a common household bleach, as it is too weak. A complete description of disinfection procedures can be found in Title 15A NCAC 02C .0111.

If the well is gravel-packed and the casing and screen have not been removed, neat cement or bentonite grout must be injected into the well, completely filling it from the bottom of the casing to the top of the well.

Wells constructed in unconsolidated formations shall be completely filled with grout by introducing it through a pipe extending to the bottom of the well. The pipe is then raised as the well is filled (commonly called a tremmie pipe).

Wells constructed in consolidated formations may be filled with grout, sand, gravel, or drilling cuttings opposite the zones of consolidated rock. The top of any sand, gravel, or cutting fill shall terminate at least 10 feet below the top of consolidated rock or 5 feet below the bottom of the casing. Grout shall be placed beginning 10 feet below the top of the consolidated rock or five feet below the bottom of the casing in a manner to ensure complete filling of the casing, and extending up to the land surface.

Other Wells

This pamphlet has summarized the abandonment procedures for water wells. However, there are many other types of wells in North Carolina that must be abandoned properly. For monitoring wells and other miscellaneous wells, refer to 15A NCAC 02C .0100: Criteria and Standards Applicable to Water Supply and Certain Other Wells.

Well Disinfection Tip

The following table can be used to determine how much chlorine compound is needed to dose 100 feet of a water-filled well to at least 100mg/l.

Borehole or Casing Diameter (inches)	Gallons of Water per 100 ft of Water Filled Well	Amount of Calcium Hypochlorite (65%-70% available chlorine)
2	16.3	0.5 oz.
4	65.3	2 oz.
6	146.9	4.4 oz.
8	261.1	7.8 oz.
10	408	12.2 oz.
12	587	1 lb.2 oz.
18	1321	2 lb. 8 oz.
20	1632	3 lbs. 1 oz.
24	2350	4 lbs. 7 oz.
30	3672	6 lbs. 14 oz.
36	5287	9 lbs. 15 oz.

For more information or a copy of the 15A NCAC 02C .0100 Well Construction Standards Criteria and Standards Applicable to Water Supply and Certain Other Wells, you can visit our webpage

http://portal.ncdenr.org/web/wq/aps/gwpro

or contact us at:

DENR
Aquifer Protection Section
1636 Mail Service Center
Raleigh, North Carolina 27699-1636
Phone: (919) 733-3221
Fax: (919) 715-0588

SUBCHAPTER 02C - WELL CONSTRUCTION STANDARDS

SECTION .0100 - CRITERIA AND STANDARDS APPLICABLE TO WATER-SUPPLY AND

15A NCAC 02C .0101 GENERAL PROVISIONS

(a) Authorization. The North Carolina Environmental Management Commission is required pursuant to G.S. 87-87 in the North Carolina Well Construction Act to adopt rules governing the location, construction, repair, and abandonment of wells, the operation of water wells or well systems with a designed capacity of 100,000 gallons per day or greater, and the installation and repair of pumps and pumping equipment.

(b) Purpose. Consistent with the duty to safeguard the public welfare, safety, health, and to protect and beneficially develop the groundwater resources of the State, it is declared to be the policy of this State to require that the location, construction, repair, and abandonment of wells, and the installation of pumps and pumping equipment conform to such reasonable standards and requirements as may be necessary to protect the public welfare, safety, health, and ground water resources.

History Note: *Authority G.S. 87-87;*
Eff. February 1, 1976;
Amended Eff. December 1, 1992; July 1, 1988;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0102 DEFINITIONS

The terms used in this Subchapter shall be as defined in G.S. 87-85 and as follows:

(1) "Abandon" means to discontinue the use of and to seal a well according to the requirements of 15A NCAC 02C .0113 of this Section.

(2) "Access port" means an opening in a well casing or well head installed for the purpose of determining the position of the water level in the well or to facilitate disinfection.

(3) "Agent" means any person who by agreement with a well owner has authority to act on his or her behalf in executing applications for permits. The agent may be either general agent or a limited agent authorized to do one particular act.

(4) "Annular Space" means the space between the casing and the walls of a borehole or outer casing or the space between a liner pipe and well casing.

(5) "Artesian flowing well" means a well in which groundwater flows above the land surface without the use of a pump and, under natural conditions, the static water level or hydraulic head elevation is greater than the land surface elevation.

(6) "ASTM" means the American Society for Testing and Materials.

(7) "Casing" means pipe or tubing constructed of materials and having dimensions and weights as specified in the rules of this Subchapter, that is installed in a borehole during or after completion of the borehole to support the side of the hole and thereby prevent caving, to allow completion of a well, to prevent formation material from entering the well, to prevent the loss of drilling fluids into permeable formations, and to prevent entry of contamination.

(8) "Clay" means a substance comprised of natural, inorganic, fine-grained crystalline mineral fragments that, when mixed with water, forms a pasty, moldable mass that preserves its shape when air dried.

(9) "Commission" means the North Carolina Environmental Management Commission.

(10) "Consolidated rock" means rock that is firm and coherent, solidified or cemented, such as granite, gneiss, limestone, slate or sandstone, that has not been decomposed by weathering.

(11) "Contaminate" or "Contamination" means the introduction of foreign materials of such nature, quality, and quantity into the groundwaters as to exceed the groundwater quality standards set forth in 15A NCAC 02L .0200.

(12) "Department" is as defined in G.S. 87-85(5a).

(13) "Designed capacity" means that capacity that is equal to the yield that is specified by the well owner or his or her agent prior to construction of the well.

(14) "Director" means the Director of the Division of Water Resources or the Director's delegate.

(15) "Division" means the Division of Water Resources.

(16) "Domestic use" means water used for drinking, bathing or other household purposes, livestock, or gardens.

(17) "Formation Material" means naturally occurring material generated during the drilling process that is composed of sands, silts, clays or fragments of rock and that is not in a dissolved state.

(18) "GPM" and "GPD" mean gallons per minute and gallons per day, respectively.

(19) "Grout" means a material approved in accordance with Rule .0107(e) of this Section for use in sealing the annular space of a well or liner or for sealing a well during abandonment.

(20) "Lead Free" means materials containing not more than a weighted average of 0.25 percent lead per Section 1417 of the Safe Drinking Water Act amended January 4, 2014.

(21) "Liner pipe" means pipe that is installed inside a completed and cased well for the purpose of preventing the entrance of contamination into the well or for repairing ruptured, corroded or punctured casing or screens.

(22) "Monitoring well" means any well constructed for the primary purpose of obtaining information about the physical, chemical, radiological, or biological characteristics of groundwater or other liquids, or for the observation or measurement of groundwater levels. This definition excludes lysimeters, tensiometers, and other devices used to investigate the characteristics of the unsaturated zone but includes piezometers, a type of monitoring well constructed solely for the purpose of determining groundwater levels. This definition includes all monitoring well types, including temporary wells and wells using Geoprobe® or direct-push technology (DPT).

(23) "Owner" means any person who holds the fee or other property rights in the well being constructed.

(24) "Pitless adapters" or "pitless units" are devices manufactured to the standards specified under 15A NCAC 02C .0107(j)(5) for the purpose of allowing a subsurface lateral connection between a well and plumbing appurtenances.

(25) "Public water system" means a water system as defined in 15A NCAC 18C, which is hereby incorporated by reference, including subsequent amendments.

(26) "Recovery well" means any well constructed for the purpose of removing contaminated groundwater or other liquids from the subsurface.

(27) "Saline" means having a chloride concentration of more than 250 milligrams per liter.

(28) "Secretary" means the Secretary of the Department of Environmental Quality or the Secretary's delegate.

(29) "Settleable solids" means the volume of solid particles in a well-mixed one liter sample that will settle out of suspension, in the bottom of an Imhoff Cone, after one hour.

(30) "Sewer Lateral" means the sewer pipe connecting a structure to a wastewater treatment collection system or a municipal or commercial sewer main line.

(31) "Site" means the land or water area where any facility, activity or situation is physically located, including adjacent or other land used in connection with the facility, activity or situation.

(32) "Specific capacity" means the yield of the well expressed in gallons per minute per foot of draw-down of the water level (gpm/ft.-dd).

(33) "Static water level" means the level at which the water stands in the well when the well is not being pumped and is expressed as the distance from a fixed reference point to the water level in the well.

(34) "Suspended solids" means the weight of those solid particles in a sample that are retained by a standard glass microfiber filter, with pore openings of one and one-half microns, when dried at a temperature between 103 and 105 degrees Fahrenheit.

(35) "Temporary well" means a well that is constructed to determine aquifer characteristics and that will be permanently abandoned or converted to a permanent well within 21 days (504 hours) of the completion of drilling of the borehole.

(36) "Turbidity" means the cloudiness in water due to the presence of suspended particles such as clay or silt that may create laboratory analytical difficulties for determining contamination above 15A NCAC 02L.

(37) "Vent" means a permanent opening in the well casing or well head, installed for the purpose of allowing changes in the water level in a well due to natural atmospheric changes or to pumping. A vent may also serve as an access port.

(38) "Water-tight" means put or fit together so tightly that water cannot enter or pass through. For example, water-tight pipe may be filled with water and tested under pressure between three and five pounds per square inch (psi) for several minutes to detect leaks.

(39) "Well" is as defined in G.S. 87-85(14).

(40) "Well capacity" means the maximum quantity of water that a well will yield continuously as determined by methods outlined in 15A NCAC 02C .0110.
(41) "Well head" means the upper terminal of the well including adapters, ports, valves, seals, and other attachments.
(42) "Well system" means two or more wells connected to the same distribution or collection system or, if not connected to a distribution or collection system, two or more wells serving the same site.
(43) "Yield" means the volume of water or other fluid per time that can be discharged from a well under a given set of circumstances.

History Note: *Authority G.S. 87-85; 87-87; 143-215.3;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; July 1, 1988; March 1, 1985; September 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0103 REGISTRATION

History Note: *Authority G.S. 87-87; 143-215.3(a)(1a); 143-355(e);*
Eff. February 1, 1976;
Amended Eff. April 1, 2001; December 1, 1992; July 1, 1988; April 20, 1978;
Repealed Eff. September 1, 2009.

15A NCAC 02C .0104 PUMP INSTALLATION REGISTRATION

History Note: *Authority G.S. 87-87;*
Eff. February 1, 1976;
Repealed Eff. July 1, 1988.

15A NCAC 02C .0105 PERMITS

(a) No person shall locate or construct any of the following wells until a permit has been issued by the Department:
(1) any water-well or well system with a designed capacity to pump 100,000 gallons per day (gpd) or more during one calendar year;
(2) any well added to an existing system if the total designed capacity of such existing well system and added well will equal or exceed 100,000 gpd;
(3) any temporary or permanent monitoring well or monitoring well system, including wells installed using direct-push technology (DPT) or Geoprobe® technology, designed to penetrate an aquifer to obtain groundwater data on property not owned by the well owner;
(4) any recovery well;
(5) any well with a design deviation from the standards specified under the rules of this Subchapter, including wells for which a variance is required.

(b) The Department shall issue permits for wells used for geothermal heating and cooling, aquifer storage and recovery (ASR), or other injection purposes in accordance with 15A NCAC 02C .0200.

(c) The Department shall issue permits for private drinking water wells in accordance with 15A NCAC 02C .0300, including private drinking water wells with a designed capacity greater than 100,000 gallons per day and private drinking water wells for which a variance is required.

(d) An application for any well requiring a permit pursuant to Paragraph (a) of this Rule shall be submitted by the owner or his or her agent. In the event that the permit applicant is not the owner of the property where the well or well system is to be constructed, the permit application shall contain written approval from the property owner and a statement that the applicant assumes total responsibility for ensuring that the well(s) will be located, constructed, maintained and abandoned in accordance with the requirements of this Subchapter.

(e) The application shall be submitted to the Department on forms furnished by the Department, which shall include the following:
(1) the owner's name;
(2) the owner's mailing address and proposed well site address;
(3) description of the well type and activity requiring a permit;
(4) site location (map);

(5) a map of the site, to scale, showing the locations of:
    (A) all property boundaries, at least one of which is referenced to a minimum of two landmarks such as identified roads, intersections, streams or lakes within 500 feet of proposed well or well system;
    (B) all existing wells, identified by type of use, within 500 feet of proposed well or well system;
    (C) the proposed well or well system;
    (D) any test borings within 500 feet of proposed well or well system; and
    (E) all sources of known or potential groundwater contamination, such as septic tank systems; pesticide, chemical or fuel storage areas; animal feedlots, as defined by G.S. 143-215.10B(5); landfills or other waste disposal areas within 500 feet of the proposed well.
(6) the well contractor's name and state certification number, if known; and
(7) a construction diagram of the proposed well(s) including specifications describing all materials to be used and methods of construction.

(f) For water supply wells or well systems with a designed capacity of 100,000 gpd or greater, the application shall include, in addition to the information required in Paragraph (e) of this Rule:
(1) the number, yield and location of existing wells in the system;
(2) the water system's name and reference number if already a public water supply system;
(3) the designed capacity of the proposed well(s);
(4) for wells to be screened in multiple zones or aquifers, representative data on the static water level and pH, specific conductance, and concentrations of sodium, potassium, calcium, magnesium, sulfate, chloride, and carbonates from each aquifer or zone from which water is proposed to be withdrawn. The data submitted shall demonstrate that construction of the proposed well will satisfy the requirements of 15A NCAC 02C .0107(h)(2);
(5) a copy of any water use permit required pursuant to G.S. 143-215.15; and
(6) any other well construction information or site specific information as requested by the Department to ensure compliance with G.S. 87-84.

(g) For those monitoring wells with a design deviation from the specifications of 15A NCAC 02C .0108 of this Section, in addition to the information required in Paragraph (e) of this Rule, the application shall include:
(1) a description of the subsurface conditions to evaluate the site. Data from test borings, wells, and pumping tests may be necessary;
(2) a description of the quantity, character and origin of the contamination;
(3) justification for the necessity of the design deviation; and
(4) any other well construction information or site specific information as requested by the Department to ensure compliance with G.S. 87-84.

(h) For those recovery wells with a design deviation from the specifications in 15A NCAC 02C .0108 of this Section, in addition to the information required in Paragraphs (e) and (g) of this Rule, the application shall describe the disposition of any fluids recovered if the disposal of those fluids will have an impact on any existing wells other than those installed for the purpose of measuring the effectiveness of the recovery well(s).

(i) In the event of an emergency, any well listed in Subparagraph (a)(1) through (a)(4) of this Rule may be constructed after verbal approval is provided by the Department. After-the-fact written applications shall be submitted by the person responsible for drilling or owner within 10 days after construction begins. The application shall include construction details of the well(s) and include the name of the person who gave verbal approval and the time and date that approval was given.

(j) The well owner or his or her agent, and the North Carolina certified well contractor shall see that a permit is secured prior to the beginning of construction of any well for which a permit is required under the rules of this Subchapter.

History Note: *Authority G.S. 87-87; 143-215.1;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; March 1, 1985; September 1, 1984; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0106 WATER USE PERMIT

History Note: *Authority G.S. 143-215.14; 143-215.15;*
Eff. February 1, 1976;
Repealed Eff. April 20, 1978.

15A NCAC 02C .0107 STANDARDS OF CONSTRUCTION: WATER SUPPLY WELLS

(a) Location.

(1) A water supply well shall not be located in any area where surface water or runoff will accumulate around the well due to depressions, drainage ways, and other landscapes that will concentrate water around the well.

(2) The horizontal separation between a water supply well and potential sources of groundwater contamination that exist at the time the well is constructed shall be no less than as follows unless otherwise specified in Subparagraph (a)(3) of this Rule:

(A) Single-family dwelling with septic tank and drainfield, including the drainfield repair area 50 feet

(B) Single-family dwelling with septic tank and drainfield, including the drainfield repair area in saprolite system as described in 15A NCAC 18A .1956 100 feet

(C) All other facilities with septic tank and drainfield, including drainfield repair area 100 feet

(D) Other subsurface ground absorption waste disposal system 100 feet

(E) Industrial or municipal residuals disposal or wastewater-irrigation sites 100 feet

(F) Industrial or municipal sewage or liquid-waste collection or sewer main, constructed to water main standards in the American Water Works Association (AWWA) Standards C600 and/or C900, which can be obtained from AWWA at American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235, at a cost of one hundred and four dollars ($104.00)
50 feet

(G) Water-tight sewer lateral line from a residence or other non-public system to a sewer main or other wastewater disposal system 25 feet

(H) Other sewage and liquid-waste collection or transfer facility 100 feet

(I) Cesspools and privies 100 feet

(J) Animal feedlots, as defined by G.S. 143-215.10B(5), or manure or litter piles 100 feet

(K) Fertilizer, pesticide, herbicide, or other chemical storage areas 100 feet

(L) Non-hazardous waste storage, treatment, or disposal lagoons 100 feet

(M) Sanitary landfills, municipal solid waste landfill facilities, incinerators, construction and demolition (C&D) landfills, and other disposal sites except Land Clearing and Inert Debris landfills
500 feet

(N) Land Clearing and Inert Debris (LCID) landfills 100 feet

(O) Animal barns 100 feet

(P) Building perimeters, including any attached structures that need a building permit, such as garages, patios, or decks, regardless of foundation construction type 25 feet

(Q) Surface water bodies that act as sources of groundwater recharge, such as ponds, lakes, and reservoirs 50 feet

(R) All other surface water bodies, such as brooks, creeks, streams, rivers, sounds, bays, and tidal estuaries 25 feet

(S) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N:

(i) with secondary containment 50 feet

(ii) without secondary containment 100 feet

(T) Above ground or underground storage tanks that contain petroleum fuels used for heating equipment, boilers, or furnaces, with the exception of tanks used solely for storage of propane, natural gas, or liquefied petroleum gas 50 feet

(U) All other petroleum or chemical storage tank systems 100 feet

(V) Gravesites 50 feet

(W) Coal ash landfills or impoundments 200 feet

(X) All other potential sources of groundwater contamination 50 feet

(3) For a water supply well as defined in G.S. 87-85(13) on a lot serving a single-family dwelling and intended for domestic use, where lot size or other fixed conditions preclude the separation distances specified in Subparagraph (a)(2) of this Rule, the required horizontal separation distances shall be the maximum possible but shall in no case be less than the following:

(A) Industrial or municipal sewage or liquid-waste collection or sewer main, constructed to water main standards as stated in the AWWA Standards C600 and/or C900 25 feet

(B) Animal barns 50 feet

(4) In addition to the separation distances specified in Subparagraph (a)(2) of this Rule, a well or well system with a designed capacity of 100,000 gallons per day (GPD) or greater shall be located a sufficient distance from known or anticipated sources of groundwater contamination so as to prevent a violation of groundwater quality standards specified in 15A NCAC 02L .0202 resulting from the movement of contaminants in response to the operation of the well or well system at the proposed rate and schedule of pumping.

(5) Wells drilled for public water supply systems regulated by the Public Water Supply Section of the Division of Water Resources shall meet the requirements of 15A NCAC 18C.

(b) Source of water.

(1) The source of water for any water supply well shall not be from a water bearing zone or aquifer that is contaminated;

(2) In designated areas described in 15A NCAC 02C .0117 of this Section, the source shall be greater than 43 feet below land surface;

(3) In designated areas described in 15A NCAC 02C .0116 of this Section, the source may be less than 20 feet below land surface, but in no case less than 10 feet below land surface;

(4) For wells constructed with separation distances less than those specified in Subparagraph (a)(2) of this Rule based on lot size or other fixed conditions as specified in Subparagraph (a)(3) of this Rule, the source shall be greater than 43 feet below land surface except in areas described in Rule .0116 of this Section; and

(5) In all other areas the source shall be at least 20 feet below land surface.

(c) Drilling Fluids. Drilling Fluids shall not contain organic or toxic substances or include water obtained from surface water bodies or water from a non-potable supply and shall be comprised only of:

(1) The formational material encountered during drilling; or

(2) Materials manufactured specifically for the purpose of borehole conditioning or water well construction.

(d) Casing.

(1) If steel casing is used:

(A) The casing shall be new, seamless, or electric-resistance welded galvanized or black steel pipe. Galvanizing shall be done in accordance with requirements of ASTM A53/A53M-07, which is hereby incorporated by reference, including subsequent amendments and editions and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of eighty dollars and forty cents ($80.40);

(B) The casing, threads and couplings shall meet or exceed the specifications of ASTM A53/A53M-07 or A589/589M-06, which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of eighty dollars and forty cents ($80.40), and fifty-two dollars ($52.00), respectively;

(C) The wall thickness for a given diameter shall equal or exceed that specified in Table 1;

TABLE 1: MINIMUM WALL THICKNESS FOR STEEL CASING:

Nominal Diameter (inches)	Wall Thickness (inches)

For 3.5 inch or smaller pipe, Schedule 40 is required

4	0.142
5	0.156
5.5	0.164
6	0.185
8	0.250
10	0.279
12	0.330
14 and larger	0.375

(D) Stainless steel casing, threads, and couplings shall conform in specifications to the general requirements in ASTM A530/A530M-04a, which is hereby incorporated by reference, including subsequent amendments and editions and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of forty-six dollars ($46.00), and also shall conform to the specific requirements in the ASTM standard that best describes the chemical makeup of the stainless steel casing that is intended for use in the construction of the well;

(E) Stainless steel casing shall have a minimum wall thickness that is equivalent to standard Schedule number 10S;

(F) Steel casing shall be equipped with a drive shoe if the casing is driven in a consolidated rock formation. The drive shoe shall be made of forged, high carbon, tempered seamless steel and shall have a beveled, hardened cutting edge; and

(G) Any materials containing lead shall meet NSF 61 standards, which can be obtained from NSF International at a cost of three hundred and twenty-five dollars ($325.00), or NSF 372 standards, which can be obtained at a cost of fifty-five dollars ($55.00). Both standards can be obtained from NSF International, P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI 48105.

(2) If thermoplastic casing is used:

(A) The casing shall be new and manufactured in compliance with standards of ASTM F480-14, which is hereby incorporated by reference including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of sixty-seven dollars ($67.00);

(B) The casing and joints shall meet or exceed all the specifications of ASTM F480-06b, except that the outside diameters shall not be restricted to those listed in ASTM F480-06b, which is hereby incorporated by reference, including subsequent amendments and editions and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of eighty dollars and forty cents ($80.40);

(C) The depth of installation for a given Standard Dimension Ratio (SDR) or Schedule number thickness shall not exceed that listed in Table 2 unless the Department is

provided written documentation from the manufacturer of the casing stating that the casing may safely be used at the depth at which it is to be installed is provided.

TABLE 2: Maximum allowable depths (in feet) of Installation of
Thermoplastic Water Well Casing. Dimensional standards for PVC pipe are specified in ASTM F 480-14.

Nominal Diameter (inches)	Maximum Depth (in feet) for Schedule 40	Maximum Depth (in feet) for Schedule 80
2	485	1460
3	415	1170
3.5	315	920
4	253	755
5	180	550
6	130	495
8	85	340
10	65	290
12	65	270
14	50	265
16	50	255

	Maximum Depth (in feet) for SDR 21	Maximum Depth (in feet) for SDR 17	Maximum Depth (in feet) for SDR 13.5
All Diameters	185	355	735

(D) Thermoplastic casing with wall thickness less than that corresponding to SDR 21 or Schedule 40 shall not be used;

(E) For wells in which the casing will extend into consolidated rock, thermoplastic casing shall be equipped with a coupling or other device approved by the manufacturer of the casing as sufficient to protect the physical integrity of the thermoplastic casing during the processes of seating and grouting the casing and subsequent drilling operations;

(F) Thermoplastic casing shall not be driven by impact, but may be pushed;

(G) PVC well casing joints shall meet the requirements of ASTM F 480-14; and

(H) Screws or similar mechanical fasteners shall not be used for joining PVC well casing.

(3) In constructing any well, all water-bearing zones that contain contaminated, saline, or other non-potable water shall be cased and grouted so that contamination of overlying and underlying groundwater zones will not occur.

(4) Every well shall be cased so that the bottom of the casing extends to the following depths:

(A) Wells located within the area described in Rule .0117 of this Section shall be cased from land surface to a depth of at least 43 feet.

(B) Wells located within the area described in Rule .0116 of this Section shall be cased from land surface to a depth of at least 10 feet.

(C) Wells constructed with separation distances less than those specified in Subparagraph (a)(2) of this Rule based on lot size or other fixed conditions as specified in Subparagraph (a)(3) of this Rule shall be cased from land surface to a depth of at least 43 feet except in areas described in Rule .0116 of this Section.

(D) Wells located in any other area shall be cased from land surface to a depth of at least 20 feet.

(5) The top of the casing shall be terminated at least 12 inches above land surface, regardless of the method of well construction and type of pump to be installed.

(6) The casing in wells constructed to obtain water from a consolidated rock formation shall meet the requirements of Subparagraphs (d)(1) through (d)(5) of this Rule and shall:

(A) prevent any formational material from entering the well in excess of the levels specified in Paragraph (h) of this Rule; and

(B) firmly be seated at least five feet into the rock.

(7) The casing in wells constructed to obtain water from an unconsolidated rock formation (such as gravel, sand, or shells) shall extend at least one foot into the top of the water-bearing formation.

(8) Upon completion of the well, the well shall be sufficiently free of obstacles including formation material as necessary to allow for the installation and proper operation of pumps and associated equipment.

(9) Prior to removing equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85(16), to preclude the entrance of contaminants into the well.

(e) Allowable Grouts.

(1) One of the following grouts shall be used wherever grout is required by a rule of this Section. Where a particular type of grout is specified by a rule of this Section, no other type of grout shall be used.

(A) Neat cement grout shall consist of a mixture of not more than six gallons of clear, potable water to one 94 pound bag of Portland cement. Up to five percent, by weight, of untreated Wyoming sodium bentonite may be used to improve flow and reduce shrinkage. The Wyoming sodium bentonite shall be 200 mesh with a yield rating of 90 barrels per ton. If bentonite is used, additional water may be added at a rate not to exceed 0.6 gallons of water for each pound of untreated Wyoming sodium bentonite.

(B) Sand cement grout shall consist of a mixture of not more than two parts sand and one part cement and not more than six gallons of clear, potable water per 94 pound bag of Portland cement.

(C) Concrete grout shall consist of a mixture of not more than two parts gravel or rock cuttings to one part cement and not more than six gallons of clear, potable water per 94 pound bag of Portland cement. One hundred percent of the gravel or rock cuttings must be able to pass through a one-half inch mesh screen.

(D) Bentonite slurry grout shall consist of a mixture of not more than 24 gallons of clear, potable water to one 50 pound bag of commercial granular Wyoming sodium bentonite. Non-organic, non-toxic substances may be added to bentonite slurry grout mixtures to improve particle distribution and pumpability. Bentonite slurry grout may only be used in accordance with the manufacturer's written instructions.

(E) Bentonite chips or pellets shall consist of pre-screened Wyoming sodium bentonite chips or compressed sodium bentonite pellets with largest dimension of at least one-fourth inch but not greater than one-fifth of the width of the annular space into which they are to be placed. Bentonite chips or pellets shall be hydrated in place. Bentonite chips or pellets shall only be used in accordance with the manufacturer's written instructions.

(F) Specialty grout shall consist of a mixture of non-organic, non-toxic materials with characteristics of expansion, chemical-resistance, rate or heat of hydration, viscosity, density, or temperature-sensitivity applicable to specific grouting requirements. Specialty grouts shall not be used without prior approval by the Director. A request for approval of a specialty grout shall be submitted to the Director and shall include the following information:

(i) a demonstration of non-toxicity, such as American National Standard Institute (ANSI) or National Sanitation Foundation, Inc. (NSF) Standard 60 certification, which is hereby incorporated by reference including subsequent amendments and editions, and can be obtained from NSF International, P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48105 at a cost of three hundred and twenty-five dollars ($325.00);

(ii) the results of an independent laboratory that demonstrate the finished product has a permeability of less that $1x10^{-6}$ centimeters per second and, if the product is used in areas of brackish or saline groundwater, the grout will not degrade over the lifetime of the well;

(iii) a general procedure for mixing and emplacing the grout;

(iv) the types of wells the request would apply to; and

(v) any other additional information the Department needs to ensure compliance with G.S. 87-84 as requested by the Department.

(2) With the exception of bentonite chips or pellets, the liquid and solid components of all grout mixtures shall be blended prior to emplacement below land surface.

(3) No fly ash, other coal combustion byproducts, or other wastes shall be used in any grout.

(f) Grout emplacement.

(1) Casing shall be grouted to a minimum depth of twenty feet below land surface except that in those areas designated in Rule .0116 of this Section, grout shall extend to a depth of two feet above the screen or, for open end wells, to the bottom of the casing, but in no case less than 10 feet.

(2) In addition to the grouting required by Subparagraph (f)(1) of this Rule, the casing shall be grouted as necessary to seal off all aquifers or zones that contain contaminated, saline, or other non-potable water so that contamination of overlying and underlying aquifers or zones shall not occur.

(3) Bentonite slurry grout may be used in that portion of the borehole that is at least three feet below land surface. That portion of the borehole from land surface to at least three feet below land surface shall be filled with a concrete or cement-type grout or bentonite chips or pellets that are hydrated in place.

(4) Grout shall be placed around the casing by one of the following methods:

(A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface;

(B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the annular space that can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application; or

(C) Other. Grout may be emplaced in the annular space by gravity flow to ensure complete filling of the space. Gravity flow shall not be used if water or any visible obstruction is present in the annular space within the applicable minimum grout depth specified in Subparagraph (f)(1) of this Rule at the time of grouting, with the exception that bentonite chips or pellets may be used if water is present and if designed for that purpose.

(5) If a rule of this Section requires grouting of the casing to a depth greater than 20 feet below land surface, the pumping or pressure method shall be used to grout that portion of the borehole deeper than 20 feet below land surface, with the exception of bentonite chips and pellets used in accordance with Part (f)(4)(C) of this Rule.

(6) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.

(7) Bentonite chips or pellets shall be used in compliance with all manufacturer's instructions including pre-screening the material to eliminate fine-grained particles, installation rates, hydration methods, tamping, and other measures to prevent bridging.

(8) Bentonite grout shall not be used to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater. For wells installed on the barrier island from the Virginia state line south to Ocracoke Inlet, chloride concentrations shall be documented and reported as required by 15A NCAC 02C .0114(1)(E).

(9) The well shall be grouted within seven days after the casing is set. If the well penetrates any water-bearing zone that contains saline water, the well shall be grouted within one day after the casing is set.

(10) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(11) If grouting is required by the provisions of this Section, the grout shall extend outward in all directions from the casing wall to a minimum thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater.

(12) In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(13) For wells constructed in locations where flowing artesian conditions are encountered the well shall be grouted to protect the artesian aquifer, prevent erosion of overlying material, and confine the flow within the casing.

(g) Well Screens.

(1) The well, if constructed to obtain water from an unconsolidated rock formation, shall be equipped with a screen that will prevent the entrance of formation material into the well after the well has been developed and completed.

(2) The well screen shall be of a design to permit the optimum development of the aquifer with minimum head loss consistent with the intended use of the well. The openings shall be designed to prevent clogging and shall be free of rough edges, irregularities, or other defects that may accelerate or contribute to corrosion or clogging.

(3) Multi-screen wells shall not connect aquifers or zones that have differences in water quality or potentiometric surfaces that would result in contamination of any aquifer or zone.

(h) Gravel and Sand-Packed Wells.

(1) In constructing a gravel-or sand-packed well:

(A) The packing material shall be composed of quartz, granite, or similar mineral or rock material and shall be of uniform size, water-washed, and free from clay, silt, and toxic materials.

(B) The size of the packing material shall be determined from a grain size analysis of the formation material and shall be of a size sufficient to prohibit the entrance of formation material into the well in concentrations above those permitted by Paragraph (i) of this Rule.

(C) The packing material shall be placed in the annular space around the screens and casing by a fluid circulation method to ensure accurate placement and avoid bridging.

(D) The packing material shall be disinfected.

(2) The packing material shall not connect aquifers or zones that have differences in water quality that would result in contamination of any aquifer or zone.

(i) All water supply wells shall be developed by the well contractor. Development shall include removal of formation materials, mud, drilling fluids, and additives, such that the water contains no more than:

(1) Five milliliters per liter of settleable solids; and

(2) Ten NTUs of turbidity as suspended solids.

Development does not require efforts to reduce or eliminate the presence of dissolved constituents that are indigenous to the ground water quality in that area.

(j) Well Head Completion.

(1) Access Port. Every water supply well shall be equipped with a usable access port or air line, except for the following: a multi-pipe deep well with jet pump or adapter mounted on the well casing or well head; and wells with casing two inches or less in diameter if a suction pipe is connected to a suction lift pump. The access port shall be at least one half inch inside the diameter opening so that the position of the water level can be determined. The port shall be installed and maintained in such manner as to prevent entrance of water or foreign material.

(2) Well Contractor Identification Plate.

(A) An identification plate, showing the well contractor and certification number and the information specified in Part (j)(2)(E) of this Rule, shall be installed on the well within 72 hours after completion of the drilling.

(B) The identification plate shall be constructed of a durable weatherproof, rustproof metal or other material approved by the Department as equivalent.

(C) The identification plate shall be permanently attached to either the aboveground portion of the well casing, surface grout pad, or enclosure floor around the casing where it is visible and in a manner that does not obscure the information on the identification plate.

(D) The identification plate shall not be removed.

(E) The identification plate shall be stamped to show the following:
  (i) the total depth of well;
  (ii) the casing depth (feet) and inside diameter (inches);
  (iii) the screened intervals of screened wells;
  (iv) the packing interval of gravel-packed or sand-packed wells;
  (v) the yield, in gallons per minute (gpm) or specific capacity in gallons per minute per foot of drawdown (gpm/ft. of drawdown);
  (vi) the static water level and the date it was measured;
  (vii) the date the well was completed.

(3) Pump Installation Information Plate.
  (A) An information plate, showing the well contractor and certification number of the person installing the pump and the information specified in Part (j)(3)(D) of this Rule, shall be permanently attached to either the aboveground portion of the well casing, the surface grout pad, or the enclosure floor, if present, where it is visible and in a manner that does not obscure the information on the identification plate, within 72 hours after completion of the pump installation;
  (B) The information plate shall be constructed of a durable, waterproof, rustproof metal or other material approved by the Department;
  (C) The information plate shall not be removed; and
  (D) The information plate shall be stamped or engraved to show the following:
    (i) the date the pump was installed;
    (ii) the depth of the pump intake; and
    (iii) the horsepower rating of the pump.

(4) Controlled flow. Every artesian flowing well shall be constructed, equipped, and operated to prevent the uncontrolled discharge of groundwater. Flow discharge control shall be provided to conserve the groundwater resource and prevent or reduce the loss of artesian hydraulic head. Flow control may consist of valved pipe connections, watertight pump connections, receiving tank, flowing well pitless adapter, packer, or other methods approved by the Department to prevent the loss of artesian hydraulic head and stop the flow of water as referenced in G.S. 87-88(d). Well owners shall be responsible for the operation and maintenance of the valve.

(5) Pitless adapters or pitless units shall be allowed as a method of well head completion under the following conditions:
  (A) Design, installation, and performance standards are those specified in PAS-97(04), which is hereby incorporated by reference including subsequent amendments and editions and can be obtained from the Water System Council National Programs Office, 1101 30th Street, N.W., Suite 500, Washington, DC 20007 at no cost;
  (B) The pitless device is compatible with the well casing;
  (C) The top of the pitless unit extends at least 12 inches above land surface;
  (D) The excavation surrounding the casing and pitless device is filled with grout from the top of the casing grout to the land surface; and
  (E) The pitless device has an access port.

(6) All openings for piping, wiring, and vents shall enter into the well at least 12 inches above land surface, except where pitless adapters or pitless units are used, and shall be sealed to preclude the entrance of contaminants into the well. The final land surface grade adjacent to the well head shall be such that surface water is diverted away from the well.

History Note: *Authority G.S. 87-87; 87-88; S.L. 2018-65;*
Eff. February 1, 1976;
Amended Eff. May 14, 2001; December 1, 1992; March 1, 1985; September 1, 1984; April 20, 1978;
Temporary Amendment Eff. August 3, 2001;
Amended Eff. September 1, 2009; August 1, 2002;
Readopted Eff. June 15, 2020.

15A NCAC 02C .0108 STANDARDS OF CONSTRUCTION: WELLS OTHER THAN WATER SUPPLY

(a) No well shall be located, constructed, operated, or repaired in any manner that may adversely impact the quality of groundwater.
(b) Injection wells shall conform to the standards set forth in Section .0200 of this Subchapter.
(c) Monitoring wells and recovery wells shall be located, designed, constructed, operated, and abandoned with materials and by methods that are compatible with the chemical and physical properties of the contaminants involved, specific site conditions, and specific subsurface conditions.
(d) Monitoring well and recovery well boreholes shall not penetrate to a depth greater than the depth to be monitored or the depth from which contaminants are to be recovered. Any portion of the borehole that extends to a depth greater than the depth to be monitored or the depth from which contaminants are to be recovered shall be grouted completely to prevent vertical migration of contaminants.
(e) The well shall not hydraulically connect:
(1) separate aquifers; or
(2) those portions of a single aquifer where contamination occurs in separate and definable layers within the aquifer.
(f) The well construction materials used shall be structurally stable, corrosion resistant, and non-reactive based upon the depth of the well and any contaminants to be monitored or recovered.
(g) The well shall be constructed in such a manner that water or contaminants from the land surface cannot migrate along the borehole annulus into any packing material or well screen area.
(h) In non-water supply wells, packing material placed around the screen shall extend one foot or greater above the top of the screen and a one foot or greater thick seal, comprised of chip or pellet bentonite or other material approved by the Department as equivalent, shall be emplaced directly above and in contact with the packing material. If shallow groundwater is observed within five feet or less of land surface during well construction, the packing material and seal shall comply with Paragraph (j) of this Rule.
(i) In non-water supply wells, grout shall be placed in the annular space between the outermost casing and the borehole wall from the land surface to the top of the bentonite seal above any well screen or to the bottom of the casing for open end wells. The grout shall comply with Paragraph (e) of Rule .0107 of this Section.
(j) For non-water supply wells in which the stabilized water table is visible within five feet of land surface during well installation or field investigation activities, well construction shall meet each of the following requirements:
(1) Packing material placed in the annular space around the well screen shall extend six inches or greater above the top of the screen;
(2) A six-inch or greater thick seal comprised of chip or pellet bentonite shall be placed in the annular space above and in direct contact with the packing material;
(3) A one-foot or greater seal of concrete or cement grout shall be installed in the annular space from land surface to the top of the bentonite seal (upper one foot of well horizon); and
(4) Shallow wells of this class shall be equipped with a two-foot or greater concrete pad around the well, flush with the land surface to prevent surface water infiltration.
If a well is installed under this Paragraph, the existence of a shallow water table shall be verified by a NC certified well contractor, licensed professional engineer, geologist, or soil scientist and noted on all documents or reporting forms submitted.
(k) All wells shall be grouted within seven days after the casing is set. If the well penetrates any water-bearing zone that contains contaminated or saline water, the well shall be grouted within one day after the casing is set.
(l) All non-water supply wells, including temporary wells, shall be secured with a locking well cap to ensure against unauthorized access and use.
(m) All non-water supply wells shall be equipped with a steel outer well casing or flush-mount cover, set in concrete, and other measures to protect the well from damage by normal site activities.
(n) Any well that would flow under natural artesian conditions shall be valved so that the flow can be regulated.
(o) In non-water supply wells, the well casing shall be terminated no less than 12 inches above land surface unless all of the following conditions are met:
(1) site-specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; and
(2) the well head is completed in such a manner so as to preclude surficial contaminants from entering the well.
(p) Each non-water supply well shall have permanently affixed an identification plate. The identification plate shall be constructed of a durable, waterproof, or rustproof material and shall contain the following information:
(1) well contractor's name and certification number;
(2) the date the well was completed;

(3) the total depth of the well;
(4) a warning that the well is not for water supply and that the groundwater may contain hazardous materials;
(5) the depth to the top and bottom of each screen; and
(6) the well identification number or name assigned by the well owner.

(q) Each non-water supply well shall be developed such that the level of turbidity or settleable solids does not preclude accurate chemical analyses of any fluid samples collected or adversely affect the operation of any pumps or pumping equipment.

(r) Wells constructed for the purpose of monitoring or testing for the presence of liquids associated with tanks regulated under 15A NCAC 02N shall be constructed in accordance with 15A NCAC 02N .0504.

(s) Wells constructed for the purpose of monitoring for the presence of vapors associated with tanks regulated under 15A NCAC 02N shall:

(1) be constructed in such a manner as to prevent the entrance of surficial contaminants or water into or alongside the well casing; and
(2) be provided with a locking well cap to ensure against unauthorized access and use.

(t) Temporary wells and all other non-water supply wells shall be constructed in such a manner as to preclude the vertical migration of contaminants within and along the borehole channel.

(u) Geotechnical borings advanced for building activities, such as foundation testing and road bed strength evaluations shall not be considered wells as defined in G.S. 87-85(14) if they are immediately abandoned after use pursuant to Rule .0113(d)(1) of this Section. These borings shall not require submittal of a well construction or abandonment record pursuant to Rule .0114 of this Section.

(v) Soil borings advanced for such activities as collecting soil samples for contamination assessment or characterization soil profiles shall not be considered wells as defined in G.S. 87-85(14) if they are not intended to penetrate the water table and are abandoned after samples are collected pursuant to Rule .0113(d)(1) of this Section. These borings shall not require submittal of a well construction or well abandonment records pursuant to Rule .0114 of this Section.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0109 PUMPS AND PUMPING EQUIPMENT

(a) The pumping capacity of the pump shall be consistent with the intended use and yield characteristics of the well.

(b) The pump and related equipment for the well shall be located to permit easy access and removal for repair and maintenance.

(c) The base plate of a pump placed directly over the well shall be designed to form a watertight seal with the well casing or pump foundation.

(d) In installations where the pump is not located directly over the well, the annular space between the casing and pump intake or discharge piping shall be closed with a watertight seal.

(e) The well head shall be equipped with a screened vent to allow for the pressure changes within the well unless a suction lift pump or single-pipe jet pump is used or artesian flowing well conditions are encountered.

(f) The person installing the pump in any water supply well shall install a threadless sampling tap at the wellhead for obtaining water samples except:

(1) In the case of suction pump or offset jet pump installations the threadless sampling tap shall be installed on the return (pressure) side of the pump piping; and
(2) In the case of pitless adapter installations, the threadless sampling tap shall be located upstream of the water storage tank.

The threadless sampling tap shall be turned downward, located a minimum of 12 inches above land surface, floor, or well pad, and positioned such that a water sample can be obtained without interference from any part of the wellhead. If the wellhead is also equipped with a threaded hose bibb in addition to the threadless sampling tap, the hose bibb shall be fitted with a backflow preventer or vacuum breaker.

(g) A priming tee shall be installed at the well head in conjunction with offset jet pump installations.

(h) Joints of any suction line installed underground between the well and pump shall be tight under system pressure.

(i) The drop piping and electrical wiring used in connection with the pump shall meet all applicable underwriters specifications.
(j) Only potable water shall be used for priming the pump.
(k) Any materials containing lead shall meet NSF 61 standards.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009, December 1, 1992; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0110 WELL TESTS FOR YIELD

(a) Every domestic well shall be tested for capacity by one of the following methods:
- (1) Pump Method
  - (A) select a permanent measuring point, such as the top of the casing;
  - (B) measure and record the static water level below or above the measuring point prior to starting the pump;
  - (C) measure and record the discharge rate at intervals of 10 minutes or less;
  - (D) measure and record water levels using a steel or electric tape at intervals of 10 minutes or less;
  - (E) continue the test for a period of at least one hour; and
  - (F) make measurements within an accuracy of plus or minus one inch.
- (2) Bailer Method
  - (A) select a permanent measuring point, such as the top of the casing;
  - (B) measure and record the static water level below or above the measuring point prior to starting the bailing procedure;
  - (C) bail the water out of the well for a period of one hour or longer;
  - (D) determine and record the bailing rate in gallons per minute at the end of the bailing period; and
  - (E) measure and record the water level after stopping bailing process.
- (3) Air Rotary Drill Method
  - (A) measure and record the amount of water being injected into the well during drilling operations;
  - (B) measure and record the discharge rate in gallons per minute at intervals of one hour or less during drilling operations;
  - (C) after completion of the drilling, continue to blow the water out of the well for 30 minutes or longer and measure and record the discharge rate in gallons per minute at intervals of 10 minutes or less during the period; and
  - (D) measure and record the water level after discharge ceases.
- (4) Air Lift Method. Measurements shall be made through a pipe placed in the well. The pipe shall have an inside diameter of at least five-tenths of an inch or greater and shall extend from top of the well head to a point inside the well that is below the bottom of the air line.
  - (A) Measure and record the static water level prior to starting the air compressor;
  - (B) Measure and record the discharge rate at intervals of 10 minutes or less;
  - (C) Measure and record the pumping level using a steel or electric tape at intervals of 10 minutes or less; and
  - (D) Continue the test for a period of one hour or longer.

(b) Public, Industrial, and Irrigation Wells. Every industrial or irrigation well and, if required by rule adopted by the Commission for Public Health, every well serving a public water supply system upon completion shall be tested for capacity by the following or equivalent method:
- (1) The water level in the well to be pumped and in all observation wells shall be measured and recorded prior to starting the test.
- (2) The well shall be tested by a pump of sufficient size and lift capacity to test the yield of the well, consistent with the well diameter and purpose.
- (3) The pump shall be equipped with throttling devices to reduce the discharge rate to approximately 25 percent of the maximum capacity of the pump.

(4) The test shall be conducted for a period of 24 hours or longer without interruption and, except for wells constructed in Coastal Plain aquifers, shall be continued for a period of four hours or longer after the pumping water level stabilizes.

(5) The pump discharge shall be set at a constant rate or rates that can be maintained throughout the testing period. If the well is tested at two or more pumping rates (a step-drawdown test), pumping at each pumping rate shall continue to the point that the pumping water level declines no more than 0.1 feet per hour for a period of four hours or more for each pumping rate, except for wells constructed to Coastal Plain aquifers. In wells constructed in Coastal Plain aquifers, pumping at each pumping rate shall continue for four hours or longer.

(6) The pump discharge rate shall be measured by an orifice meter, flowmeter, weir, or equivalent metering device. The metering device used shall have a calibration accuracy within plus or minus five percent of a known standard.

(7) The discharge rate of the pump and time shall be measured and recorded at intervals of 10 minutes or less during the first two hours of the pumping period for each pumping rate. If the pumping rate is constant after the first two hours of pumping, discharge measurements and recording may be made at longer time intervals not to exceed one hour.

(8) The water level in each well and time shall be measured and recorded at intervals of five minutes or less during the first hour of pumping and at intervals of 10 minutes or less during the second hour of pumping. After the second hour of pumping, the water level in each well shall be measured at such intervals that the lowering of the pumping water level does not exceed three inches between measurements.

(9) A reference point for water level measurements shall be selected and recorded for the pumping well and each observation well to be measured during the test. All water level measurements shall be made from the selected reference points, which shall be permanently marked.

(10) All water level measurements shall be made with a steel or electric tape or equivalent measuring device.

(11) All water level measurements shall be made within an accuracy of plus or minus one inch or to 0.1 foot.

(12) After the completion of the pumping period, measurements of the water level recovery rate in the pumped well shall be made in the same manner as the drawdown for a period of two hours or greater.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0111 DISINFECTION OF WATER SUPPLY WELLS

(a) Any person constructing, repairing, testing, or performing maintenance or installing a pump in a water supply well shall disinfect the well upon completion of construction, repairs, testing, maintenance, or pump installation.

(b) Any person disinfecting a well shall perform disinfection in accordance with the following procedures:

(1) Chlorination.

(A) Hypochlorite shall be placed in the well in sufficient quantities to produce a chlorine residual of at least 100 parts per million (ppm) in the well. Stabilized chlorine tablets or hypochlorite products containing fungicides, algaecides, or other disinfectants shall not be used. Chlorine test strips or other quantitative test methods shall be used to confirm the concentration of the chlorine residual.

(B) The hypochlorite shall be placed in the well by one of the following or equivalent methods:

(i) Granular hypochlorite may be dropped in the top of the well and allowed to settle to the bottom; or

(ii) Hypochlorite solutions shall be placed in the bottom of the well by using a bailer or by pouring the solution through the drill rod, hose, or pipe placed in the bottom of the well. The solution shall be flushed out of the drill rod, hose, or pipe by using water or air.

(C) The water in the well shall be agitated or circulated to ensure thorough dispersion of the chlorine.

(D) The well casing, pump column, and any other equipment above the water level in the well shall be rinsed with the chlorine solution as a part of the disinfecting process.

(E) The chlorine solution shall stand in the well for a period of 24 hours or more.

(F) The well shall be pumped until there is no detectable total chlorine residual in water pumped from the well before the well is placed in use.

(2) Other alternate materials and methods of disinfection, at least as effective as those set forth in Subparagraph (b)(1) of this Rule, may be used upon prior approval by the Department. A written request for approval of alternate disinfection methods or materials shall be submitted to the Director and will be approved or denied on a case-by-case basis following a review of the information submitted in this Subparagraph. The written request shall include the following information:

(A) a demonstration that the method of disinfection will be at least as effective as chlorination as described under in Subparagraph (b)(1) of this Rule;

(B) a demonstration of non-toxicity, such as ANSI or NSF Standard certification or EPA studies;

(C) the general procedures for the disinfection and emplacement, including the amount of product to be used per unit volume of the well;

(D) a demonstration that, after disinfection is completed, the water within the well will meet 15A NCAC 02L groundwater standards; and

(E) any other information requested by the Department to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; July 1, 1988; September 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0112 WELL MAINTENANCE: REPAIR: GROUNDWATER RESOURCES

(a) A well that is not maintained by the owner to conserve and protect the groundwater resources or that constitutes a source or channel of contamination to the water supply or any aquifer shall be permanently abandoned in accordance with Rule .0113(b) of this Section.

(b) Wells that are used for dewatering shall be permanently abandoned in accordance with Rule .0113(b) of this Section within 30 days of completion of the dewatering activity.

(c) All materials used in the maintenance, replacement, or repair of any well shall be in accordance with Rules .0107 and .0108 of this Section.

(d) Broken, punctured, or otherwise defective or unserviceable casing, screens, fixtures, seals, or any part of the well head shall be repaired or replaced, or the well shall be permanently abandoned in accordance with Rule .0113(b) of this Section.

(e) NSF International approved PVC pipe rated at 160 PSI may be used for liner pipe. The annular space around the liner casing shall be five-eighths inches or greater and shall be completely filled with neat-cement grout or sand cement grout. The well liner shall be completely grouted within 10 working days after collection of water samples or completion of other testing to confirm proper placement of the liner or within 10 working days after the liner has been installed if no sampling or testing is performed.

(f) No well shall be repaired or altered such that the well head is completed less than 12 inches above land surface. Any grout excavated or removed as a result of the well repair shall be replaced in accordance with Rule .0107(f) of this Section.

(g) Well rehabilitation by noncontinuous chemical treatment shall be conducted using methods and materials approved by the Department based on a demonstration that the materials and methods used will not create a violation of groundwater standards in 15A NCAC 02L, including rendering the groundwater unsuitable for its intended best use after completion of the rehabilitation. A written request for approval of a noncontinuous chemical treatment shall be submitted to the Director and shall include the following information:

(1) a demonstration of non-toxicity, such as ANSI or NSF Standard certification or EPA studies;

(2) the general procedures for the rehabilitation, including the amount of product to be used per unit volume of the well;
(3) a demonstration that, after rehabilitation is completed, the water within the well will meet 15A NCAC 02L groundwater standards;
(4) a description of the dosing frequency; and
(5) after submittal of request, any other information necessary for the Department to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009, August 1, 2002; April 1, 2001; December 1, 1992; September 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0113 ABANDONMENT OF WELLS

(a) A well that is temporarily removed from service shall be temporarily abandoned in accordance with the following procedures:
(1) The well shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85(16), compatible with the casing and installed so that it cannot be removed without the use of hand tools or power tools.
(2) The well shall be maintained whereby it is not a source or channel of contamination during temporary abandonment.

(b) Permanent abandonment of water supply wells other than bored or hand dug wells shall be performed in accordance with the following procedures:
(1) All casing and screen materials may be removed prior to initiation of abandonment procedures if such removal will not cause or contribute to contamination of the groundwaters.
(2) The entire depth of the well shall be sounded before it is sealed to ensure freedom from obstructions that may interfere with sealing operations.
(3) Except in the case of temporary wells and monitoring wells, the well shall be disinfected in accordance with Rule .0111(b)(1)(A) through .0111(b)(1)(C) of this Section.
(4) In the case of gravel-packed wells in which the casing and screens have not been removed, neat-cement or bentonite slurry grout shall be injected into the well, completely filling it from the bottom of the casing to the top.
(5) Wells constructed in unconsolidated formations shall be completely filled with grout by introducing it through a pipe extending to the bottom of the well that can be raised as the well is filled.
(6) Wells constructed in consolidated rock formations or that penetrate zones of consolidated rock may be filled with grout, sand, gravel or drill cuttings within the zones of consolidated rock. The top of any sand, gravel or cutting fill shall terminate at least 10 feet below the top of the consolidated rock or five feet below the bottom of casing. Grout shall be placed beginning 10 feet below the top of the consolidated rock or five feet below the bottom of casing in a manner to ensure complete filling of the casing, and extend up to the land surface. For any well in which the depth of casing or the depth of the bedrock is not known or cannot be confirmed, the entire length of the well shall be filled with grout up to the land surface.

(c) For bored wells or hand dug water supply wells constructed into unconsolidated material:
(1) The well shall be disinfected in accordance with Rule .0111(b)(1)(A) through .0111(b)(1)(C) of this Section.
(2) All plumbing or piping in the well and any other obstructions inside the well shall be removed from the well.
(3) The uppermost three feet of well casing shall be removed from the well.
(4) All soil or other subsurface material present down to the top of the remaining well casing shall be removed, including the material extending 12 inches or greater outside of the well casing;
(5) The well shall be filled to the top of the remaining casing with grout, dry clay, or material excavated during construction of the well. If dry clay or material excavated during construction of the well is used, it shall be emplaced in lifts no more than five feet thick, each compacted in place prior to emplacement of the next lift.

(6) A six-inch thick concrete grout plug shall be placed on top of the remaining casing such that it covers the entire excavated area above the top of the casing, including the area extending 12 inches or greater outside the well casing.

(7) The remainder of the well above the concrete plug shall be filled with grout or soil.

(d) All wells other than water supply wells, including temporary wells, monitoring wells, or test borings:

(1) less than 20 feet in depth that do not penetrate the water table shall be abandoned by filling the entire well up to land surface with grout, dry clay, or material excavated during drilling of the well and then compacted in place;

(2) greater than 20 feet in depth or that penetrate the water table shall be abandoned by completely filling with a bentonite or cement - type grout; and

(3) constructed in consolidated rock formations or that penetrate zones of consolidated rock may be filled with grout, sand, gravel, or drill cuttings within the zones of consolidated rock. The top of any sand, gravel or cutting fill shall terminate 10 feet or greater below the top of the consolidated rock or five feet below the bottom of the casing. Grout shall be placed beginning 10 feet below the top of the consolidated rock or five feet below the bottom of the casing in a manner to ensure complete filling of the casing and shall extend up to the land surface. For any well in which the depth of the casing or the depth of the bedrock is not known or cannot be confirmed, the entire length of the well shall be filled with grout up to the land surface.

(e) Any well that acts as a source or channel of contamination shall be repaired or permanently abandoned within 30 days of receipt of notice from the Department.

(f) All wells shall be permanently abandoned in which the casing has not been installed or from which the casing has been removed, prior to removing drilling equipment from the site.

(g) The well owner is responsible for permanent abandonment of a well except that:

(1) the well contractor is responsible for well abandonment if abandonment is required because the well contractor improperly locates, constructs, repairs or completes the well;

(2) the person who installs, repairs or removes the well pump is responsible for well abandonment if that abandonment is required because of improper well pump installation, repair or removal; or

(3) the well contractor (or individual) who conducts a test boring is responsible for its abandonment at the time the test boring is completed.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0114 DATA AND RECORDS REQUIRED

Reports.

(1) A person completing or abandoning a well, including wells installed using direct push technology (DPT)(e.g., Geoprobe®), shall submit to the Division a record of the construction, on form GW-1, or abandonment, on form GW-30. For water supply wells, a copy of each completion or abandonment record shall also be submitted to the health department responsible for the county in which the well is located. The record shall be on forms provided by the Division and shall include:

(A) a certification that construction or abandonment was completed as required by this Section;

(B) the owner's name and address;

(C) the latitude and longitude of the well with a position accuracy of 100 feet or less;

(D) the diameter, depth, and yield of the well;

(E) the chloride concentration for wells installed in the area delineated in Rule .0107(f)(8) of this Section; and

(F) after submittal of form, any other information necessary as requested by the Department to ensure compliance with G.S. 87-84.

(2) The certified record of completion or abandonment shall be submitted within a period of thirty days after completion or abandonment. For multiple DPT/Geoprobe® wells having the same construction, only one GW-1 or GW-30 is required to be submitted if the total number of wells is indicated on the form.

(3) Furnishing of records to any person or agency other than the Division shall not constitute compliance with the reporting requirement and shall not relieve the well contractor of his or her reporting requirement to the Division.

History Note: *Authority G.S. 87-87; 87-88;*
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0115 DIAGRAMS AND FORMS

History Note: *Authority G.S. 87-87;*
Eff. February 1, 1976;
Amended Eff. April 20, 1978;
Repealed Eff. September 1, 1984.

15A NCAC 02C .0116 DESIGNATED AREAS: WATER SUPPLY WELLS CASED TO LESS THAN 20 FEET

(a) If the best or only source of potable water exists between 10 and 20 feet below the surface of the land, water supply wells may be cased to a depth less than 20 feet in the following areas:

(1) in Currituck County in an area between the sound and a line beginning at the end of SR 1130 near Currituck Sound, thence north to the end of SR 1133, thence north to the end of NC 136 at the intersection with the sound;
(2) on the barrier island from the Virginia state line, south to Ocracoke Inlet;
(3) all areas lying between the Intracoastal Waterway and the ocean from New River Inlet south to New Topsail Inlet; and
(4) all areas lying between the Intracoastal Waterway and the ocean from the Cape Fear River south to the South Carolina line.

(b) Pursuant to Rule .0118 of this Section, water supply wells may be cased to a depth less than 20 feet, if:

(1) the only or best source of drinking water in the area exists between a depth of 10 and 20 feet below the surface of the land; and
(2) using this source of water in the area is in the best interest of the public.

(c) In all other areas, the source of water shall be at least 20 feet below land surface. However, when adequate quantities of potable water cannot be obtained below a depth of 20 feet, the source of water may be obtained from unconsolidated rock formations at depths less than 20 feet provided that:

(1) adequate quantities of water of acceptable quality for the intended use is not available to a minimum depth of 50 feet can be shown to exist;
(2) the proposed source of water is the maximum feasible depth above 20 feet, but in no case less than 10 feet; and
(3) the regional office of the Department is notified prior to the construction of a well obtaining water from a depth between 10 and 20 feet below land surface.

History Note: *Authority G.S. 87-87;*
Eff. April 20, 1978;
Amended Eff. September 1, 2009; December 1, 1992; July 1, 1988; September 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0117 DESIGNATED AREAS: WATER SUPPLY WELLS CASED TO MINIMUM DEPTH OF 43 FEET

Water supply wells constructed in the following areas or within 400 feet of the following areas shall be cased to a minimum depth of 43 feet and grouted to a depth of 20 feet:

(1) Anson County generally west of a line beginning at the intersection of the runs of the Pee Dee River and Buffalo Creek, thence generally northeast to SR 1627, thence generally south along SR 1627 to the intersection with SR 1632, thence generally west along SR 1632 to the intersection with US 52, thence generally south along US 52 to the intersection with SR 1418, thence generally

southwest along SR 1418 to the intersection of NC 218, thence south along NC 218 to the intersection with US 74, thence generally west along US 74 to the intersection of SR 1251, thence generally southwest along SR 1251 to the intersection with SR 1240, thence generally southeast along SR 1240 to the intersection with SR 1252, thence generally south along SR 1252 to the intersection with SR 1003, thence generally west along SR 1003 to the Union County line;

(2) Cabarrus County generally east of a line beginning at the intersection of SR 1113 and the Union County line, thence generally northeast along SR 1113 to the intersection with SR 1114, thence generally east along SR 1114 to the Stanly County line, thence generally northeast along the county line to the intersection with SR 1100, thence generally northeast along SR 1100 to the intersection of with SR 2622, thence generally southeast along SR 2622 to the intersection with SR 2617, thence generally northeast along SR 2617 to the intersection with SR 2611, thence generally north along SR 2611 to the intersection with NC 73, thence generally east along NC 73 to the intersection with SR 2453, thence generally northeast along SR 2453 to the intersection with SR 2444, thence generally northeast along SR 2444 to the Rowan County line;

(3) Davidson County generally east of a line starting at the intersection of the runs of Abbotts Creek and the Yadkin River in High Rock Lake, thence generally north along Abbotts Creek to NC 8 bridge, thence generally north along NC 8 to the intersection with Interstate 85, thence generally northeast along Interstate 85 to the intersection with US 64, thence generally southeast along US 64 to the Randolph County line;

(4) Montgomery County generally west of a line beginning at the intersection of SR 1134 with the Randolph County line, thence generally south along SR 1134 to the intersection with SR 1303, thence generally south along SR 1303 to the intersection with NC 109, thence generally southeast along NC 109 to the intersection with SR 1150, thence generally south along SR 1150 to the intersection with NC 73, thence generally southeast along NC 73 to the intersection with SR 1227, thence generally east along SR 1227 to the intersection with SR 1130, thence generally northeast along SR 1130 to the intersection with SR 1132, thence generally southeast along SR 1132 to the intersection with SR 1174, thence generally east along SR 1174 to the intersection with NC 109, thence generally north along NC 109 to the intersection with SR 1546, generally southeast along SR 1546 to the intersection of SR 1543, thence generally south along SR 1543 to the intersection with NC 731, thence generally west along NC 731 to the intersection with SR 1118, thence generally southwest along SR 1118 to the intersection with SR 1116, thence generally west along SR 1116 to the intersection with NC 109, thence generally south along NC 109 to the intersection with the Richmond County line;

(5) Randolph County generally west of a line beginning at the intersection of US 64 with the Davidson County line, thence generally east along US 64 to the intersection with NC 49, thence generally southwest along NC 49 to the intersection with SR 1107, thence generally south along SR 1107 to the intersection with SR 1105, thence southeast along SR 1105 to the intersection with the Montgomery County line;

(6) Rowan County generally east of a line beginning at the intersection of SR 2352 with the Cabarrus County line, thence generally northeast along SR 2352 to the intersection with SR 2353, thence generally north along SR 2353 to the intersection with SR 2259, thence generally northeast along SR 2259 to the intersection with SR 2142, thence north along SR 2142 to the intersection with SR 2162, thence generally northeast along SR 2162 to the intersection with the run of the Yadkin River in High Rock Lake;

(7) Union County generally east of a line beginning at the intersection of SR 1117 with the South Carolina-North Carolina State line, thence generally north along SR 1117 to the intersection with SR 1111, thence generally northwest along SR 1111 to the intersection with NC 75, thence generally northwest along NC 75 to the intersection with NC 16, thence generally north along NC 16 to the intersection with SR 1008, thence generally northeast along SR 1008 to the intersection with SR 1520, thence generally northeast along SR 1520 to the intersection with NC 218, thence generally east along NC 218 to the intersection with US 601, thence generally north along US 601 to the intersection with SR 1600, thence generally northeast along SR 1600 to the intersection with the Cabarrus County line; and

(8) Stanly County -- all.

History Note: *Authority G.S. 87-87; S.L. 2018-65*

Eff. April 20, 1978;
Amended Eff. September 1, 2009, April 1, 2001;
Readopted Eff. June 15, 2020.

15A NCAC 02C .0118 VARIANCE

(a) The Secretary may grant a variance from any construction standard under the rules of this Section, as set forth in Rule .0119 of this Section. Any variance request shall be submitted using the official form approved the Division as set forth in Paragraph (b) of this Rule and may be granted by the Secretary to the person responsible for the construction of the well for which the variance is sought, if:

(1) the use of the well will not endanger human health and welfare or the groundwaters; and
(2) construction in accordance with the standards is not technically feasible in such a manner as to afford a reasonable water supply at a reasonable cost.

(b) The variance request application form shall be submitted to the Division and shall include the following:

(1) the owner's name, mailing address, and Email address;
(2) the owner's telephone number(s);
(3) the physical location of the well site;
(4) the well contractor's name and State certification number;
(5) the well contractor's mailing address and Email address;
(6) the well contractor's telephone number(s);
(7) a map of the site, to scale, showing the locations of all existing and proposed well(s) in relation to:
    (A) road names and property boundaries;
    (B) buildings and structures;
    (C) other wells;
    (D) surface water bodies; and
    (E) known sources of contamination;
(8) the reason for the variance request;
(9) a construction diagram of the proposed well(s) including specifications describing all atypical materials or methods to be used and means for assuring the integrity and quality of the finished well(s);
(10) a copy of the local well application and permit, if applicable;
(11) the signatures of the well contractor and well owner(s); and
(12) after submittal of form, any other information necessary as requested by the Department to ensure compliance with G.S. 87-84.

(c) The Secretary may impose such conditions on a variance or the use of a well for which a variance is granted and is necessary to ensure compliance with G.S. 87-84. The facts supporting any variance under this Rule shall be in writing and made part of the variance.

(d) The Secretary shall respond in writing to a request for a variance within 30 days after the receipt of the variance request.

(e) A variance applicant who is dissatisfied with the decision of the Secretary may commence a contested case by filing a petition under G.S. 150B-23 within 60 days after receipt of the decision.

History Note: *Authority G.S. 87-84; 87-87; 87-88; 143-215.3(a)(4);*
Eff. April 20, 1978;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; September 1, 1988; September 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0119 DELEGATION

(a) The Secretary is delegated the authority to grant permission for well construction under G.S. 87-87.

(b) The Secretary is delegated the authority to give notices and sign orders for violations under G.S. 87-91.

(c) The Secretary may grant a variance from any construction standard, or the approval of alternate construction methods or materials, specified under Rule .0118 of this Section.

History Note: *Authority G.S. 143-215.3(a)(4);*
Eff. March 1, 1985;
Amended Eff. October 1, 2009; December 1, 1992;
Readopted Eff. September 1, 2019.

SECTION .0200 - CRITERIA AND STANDARDS APPLICABLE TO INJECTION WELLS

15A NCAC 02C .0201 PURPOSE

The rules in this Section establish classes of injection wells and set forth requirements and procedures for permitting, constructing, operating, monitoring, reporting, and abandoning approved types of injection wells. They also establish standards for abandoning, monitoring, and reporting non-permitted wells used for the injection of wastes or any substance of a composition and concentration such that, if it were discharged to the land or waters of the State, would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage. Except as provided for in G.S. 143-215.1A, the discharge of any wastes to the subsurface by means of wells is prohibited by G.S. 143-214.2(b).

History Note: *Authority G.S. 87-84; 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); Eff. August 1, 1982; Amended Eff. May 1, 2012; September 1, 1996; Readopted Eff. September 1, 2019.*

15A NCAC 02C .0202 SCOPE

The rules in this Section apply to all construction, operation, use, modification, alteration, repair, and abandonment activities of all injection wells as defined herein. These Rules do not apply to subsurface distribution systems associated with sewage treatment and disposal permits issued in accordance with G.S. 130A.

History Note: *Authority G.S. 87-86; 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); Eff. August 1, 1982; Amended Eff. May 1, 2012; September 1, 1996; Readopted Eff. September 1, 2019.*

15A NCAC 02C .0203 CONFLICT WITH OTHER LAWS, RULES, AND REGULATIONS

The provisions of any federal, county, or municipal laws, rules, or regulations establishing injection well standards affording greater protection to the public welfare, safety, and health and to the groundwater resources shall prevail, within the jurisdiction of such agency or municipality, over standards established by the rules in this Section.

History Note: *Authority G.S. 87-87; 87-96; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); Eff. August 1, 1982; Amended Eff. September 1, 1996; Readopted Eff. September 1, 2019.*

15A NCAC 02C .0204 DEFINITIONS

In addition to the terms defined in Rule .0102 of this Subchapter, the following terms and phrases apply:

(1) "Abandonment or Plugging Record" means a listing of permanent or temporary abandonment of a well and may contain a well log or description of amounts and types of abandonment material used, the method employed for abandonment, a description of formation location, formation thickness, and location of abandonment structures.

(2) "Aquifer Storage and Recovery Well (ASR)" means a well that is used to inject potable water for the purposes of subsurface storage and for later recovery of the injected water.

(3) "Area of Review" means the area around an injection well as specified in each applicable rule.

(4) "Best intended usage" means best usage as used in 15A NCAC 02L .0201 for each groundwater classification.

(5) "Catastrophic Collapse" means the collapse of overlying strata caused by removal of underlying materials.

(6) "Closed-Loop Geothermal Well System" means a system of continuous piping, part of which is installed in the subsurface via vertical or angled borings, through which moves a fluid that does not exit the piping, but is used to transfer heat energy between the subsurface and the fluid in

association with a heating and cooling system. A variation of this type of system consists of the continuous piping emplaced into a water supply well such that the standing column of groundwater serves as the heat transfer medium.

(7) "Closed-Loop Groundwater Remediation System" is as defined in G.S. 143-215.1A.

(8) "Cluster" means two or more geothermal injection wells connected to the same manifold or header of a geothermal heating and cooling system.

(9) "Confined or Enclosed Space" means any space that has a restricted means of entry and exit and is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere.

(10) "Confining Zone" means a geological formation, group of formations, or part of a formation that is capable of limiting movement of groundwater.

(11) "Contaminant" is as defined in 15A NCAC 02L .0102.

(12) "Flow Rate" means the volume per unit time of a fluid moving past a fixed reference point.

(13) "Fluid" means a material or substance which is capable of flowing whether in a semisolid, liquid, sludge, gas, or other form or state.

(14) "Formation Fluid" means fluid present in a formation under natural conditions. This shall not include introduced fluids, such as drilling mud and grout, used to facilitate the construction or development of a well.

(15) "Generator" means any person, identified by site location, whose act or process produces hazardous waste.

(16) "Groundwaters" mean those waters occurring in the subsurface under saturated conditions.

(17) "Hazardous Waste" means any solid, semisolid, liquid, or contained gaseous waste or combination thereof that, because of its quantity, concentration, or physical, chemical or infectious characteristic, may:

(a) cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

(b) pose a present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

(18) "Hazardous Waste Management Facility" means all contiguous land and structures and other appurtenances and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

(19) "Hose Bibb or Tap" means a fluid sampling port located on or appurtenant to a well.

(20) "Hydraulic Conductivity" means the volume of water at the existing kinematic viscosity that will move in a porous medium in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

(21) "Hydraulic or Pneumatic Fracturing" means the intentional act of injecting potable water, ambient air, or other approved fluids, which may carry a proppant, for the purpose of forming new fractures or propagating existing fractures in a geologic formation or portion thereof with the intent of increasing the formation's permeability.

(22) "Hydrostratigraphic Unit" means a body of rock or unconsolidated sediment distinguished and characterized by observable hydraulic properties that relate to its ability to receive, store, transmit, and yield water.

(23) "Infiltration gallery" means a subsurface ground absorption system designed for the introduction of treated wastewater into the subsurface environment.

(24) "Injectant" means a solid or fluid that is emplaced in the subsurface by means of an injection well.

(25) "Injection" means emplacement or discharge into the subsurface of a solid or fluid substance or material. This definition shall exclude drilling fluids, grout used in association with well construction or abandonment, and fluids used in connection with well development, disinfection, rehabilitation, or stimulation.

(26) "Injection Well" means any well as defined in G.S. 87-85 whose depth is greater than its largest surface dimension and that is used, or intended to be used, for the injection of fluids or solids into the subsurface or groundwaters.

(27) "Injection Zone" means a geological formation, group of formations, or part of a formation receiving solids or fluids through an injection well.

(28) "In-situ Thermal (IST) Well Systems" means a well or wells that are used to apply heat in a targeted subsurface zone to promote remediation, such as electrical resistance heating (ERH), thermal conductive heating (TCH), or steam enhanced extraction (SEE).

(29) "Lithology" means the description of rocks or sediments on the basis of their physical and chemical characteristics.

(30) "Lithostratigraphic Unit" means a body of rock or unconsolidated sediment that is distinguished and characterized by observable lithologic features or its position relative to other bodies of rock or unconsolidated sediment.

(31) "Mechanical Integrity" means:

(a) an absence of a leak in the casing, tubing, or packer of an injection well; and

(b) an absence of fluid movement through vertical channels adjacent to the injection well bore.

(32) "Operation" means any injection well or system.

(33) "Oversight agency" means the state or local agency with jurisdiction over a contamination incident.

(34) "Permit" means an authorization, license, or equivalent control document issued by the Director to implement the requirements of the rules of this Section.

(35) "Permitted by Rule" means that the injection activity is authorized by the rules of this Section and does not require the issuance of an individual permit when injection wells are constructed and operated in accordance with the rules of this Section.

(36) "Plug" means the act or process of stopping the flow of fluids into or out of a formation through a borehole or well penetrating that formation.

(37) "Potable Water" means those waters of the State that are suitable for drinking, culinary, or food processing purposes.

(38) "Pressure" means the total load or force per unit area acting on a surface.

(39) "Proppant" means a granular substance such as quartz sand or other material approved by the Department of Health and Human Services' Division of Public Health that is used to hold open cracks formed in the subsurface as a result of hydraulic or pneumatic fracturing.

(40) "Receptor" means any human, plant, animal, or structure that is, or has the potential to be, affected by the release or migration of contaminants. Any well constructed for the purpose of monitoring groundwater and contaminant concentrations shall not be considered a receptor.

(41) "Subsidence" means the lowering of the natural land surface in response to earth movements; reduction of formation fluid pressure; removal of underlying supporting material by mining or solution of solids, either artificially or from natural causes; compaction due to wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

(42) "Subsurface Distribution System" means an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids or solids below the surface of the ground.

(43) "Transmissivity" means the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the aquifer thickness.

(44) "Thermally Enhanced Grout" is a grout that is used to seal or grout water well annular spaces and geothermal ground source heat loops. It is engineered to provide efficient heat transfer and to create a low permeability seal.

(45) "Underground Sources of Drinking Water" means all underground waters of the State classified as existing or potential water supplies in 15A NCAC 02L.

(46) "Waste" is as defined in G.S. 143-213(18).

(47) "Waters" or "Waters of the State" is as defined in G.S. 143-212.

(48) "Water table" is as defined in 15A NCAC 02L .0102.

History Note: *Authority G.S. 87-85; 87-87; 143-213; 143-215.1A;*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; July 1, 1988; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0205 AREA OF REVIEW

History Note: *Authority G.S. 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. September 1, 1996;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0206 CORRECTIVE ACTION

(a) Injection wells not constructed in compliance with these Rules shall be brought into compliance with the rules in this Section or abandoned by the person responsible for the construction of the wells within 30 calendar days of becoming aware of any noncompliance.

(b) If operation of any injection facility is not in compliance with the requirements of the rules in this Section, or if continued operation of the injection facility threatens any water quality standard or classification established under the authority of G.S. 143-214.1, the owner of the injection facility shall:

(1) stop all injection activities;

(2) notify the Division orally by the close of the next business day and in writing within five calendar days of becoming aware of any noncompliance;

(3) perform a site assessment and submit the site assessment to the Division within 30 calendar days of notifying the Division. The Director may approve an alternate time period greater than 30 calendar days based on the severity and extent of noncompliance. The site assessment report shall include a description of:

(A) the source and cause of contamination;

(B) any imminent hazards to public health and safety and actions taken to mitigate them;

(C) all receptors and exposure pathways;

(D) the horizontal and vertical extent of soil and groundwater contamination and all factors affecting the contaminant transport; and

(E) any geological and hydrogeological features influencing the movement or chemical or physical character of the contaminants; and

(4) submit a corrective action plan and a proposed schedule for implementation of the corrective action to the Director for approval. In reviewing the proposed plan and schedule, the Director shall consider the compliance history of the well owner, the severity and extent of noncompliance, and any other criteria necessary for the protection of human health and the environment. The corrective action plan shall include:

(A) a description of the proposed corrective action and the reasons for its selection;

(B) specific plans, including engineering details where applicable, for restoring the groundwater quality and for restoring the integrity of the injection facility if the injection activity is to continue;

(C) a schedule for the implementation and operation of the proposed plan; and

(D) a monitoring plan for evaluating the effectiveness of the proposed corrective action.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0207 MECHANICAL INTEGRITY

(a) An injection well has internal mechanical integrity, meaning there is no leak in the casing, tubing, or packer, as demonstrated by one of the following methods:

(1) monitoring of the tubing-casing annulus pressure, following an initial pressure test, with sufficient frequency to be representative. This test shall be performed at the well head while maintaining an annulus pressure different from atmospheric pressure;

(2) pressure testing with liquid or gas; or

(3) any other method proposed by the permittee and approved by the Director as equally effective.

(b) An injection well has external mechanical integrity, meaning there is no fluid movement into groundwaters through vertical channels adjacent to the injection well bore, as determined by one of the following methods:

(1) the results of a temperature or noise log;

(2) grouting records plus predictive calculations demonstrating that the injection pressures will not exceed the strength of the grout; or

(3) any other method proposed by the permittee and approved by the Director as equally effective.

(c) In conducting and evaluating the tests enumerated in this Section or other tests allowed by the Director, the owner or operator shall apply methods and standards generally accepted in the industry. When the well owner or operator reports the results of mechanical integrity tests, a description of the tests and the methods used shall be included.

(d) The Director may require additional or alternative tests if the results presented by the owner or operator under Paragraph (c) of this Rule do not demonstrate that an injection well has mechanical integrity.

(e) If an injection well fails to demonstrate mechanical integrity, the well owner or operator shall take corrective action as specified in Rule .0206 of this Section.

History Note: *Authority G.S. 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0208 FINANCIAL RESPONSIBILITY

When required by the rules of this Section, the permittee shall maintain and demonstrate financial responsibility and resources in the form of performance bonds, trust funds, surety bonds, letters of credit, financial tests, insurance or corporate guarantees, or other forms of financial assurances approved by the Director as equivalent to close, plug, and abandon the injection operation.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 40 C.F.R. 144.52(a)(7); 40 C.F.R. 145.11(a)(20);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0209 CLASSIFICATION OF INJECTION WELLS

Injection Wells are classified as follows:

(1) Class 1. No person shall construct, use, or operate an injection well of this class. This class applies to industrial, municipal, and nuclear disposal wells that are used to inject wastes beneath the lowermost formation containing underground sources of drinking water. A description of the primary function for wells of this class is as follows:
   (a) Hazardous Waste Disposal Well. These wells are used by generators of hazardous wastes or owners of hazardous waste management facilities to inject hazardous waste.
   (b) Industrial Disposal Well. These wells are used to inject non-hazardous industrial waste.
   (c) Municipal Disposal Well. These wells are used to inject non-hazardous waste.
   (d) Nuclear Disposal Well. These wells are used to inject nuclear waste.

(2) Class 2. No person shall construct, use, or operate an injection well of this class. This class applies to oil and gas production and storage related injection wells and includes wells that are used to inject fluids:
   (a) that are brought to the surface in connection with natural gas storage operations or conventional oil or natural gas production;
   (b) for enhanced recovery of oil or natural gas; and
   (c) for storage of hydrocarbons that are liquid at standard temperature and pressure.

(3) Class 3. No person shall construct, use, or operate an injection well of this class. This class applies to wells that are used for the purpose of extraction of minerals or energy. A description of the primary function for wells of this class is as follows:
   (a) In Situ Production of Uranium or Other Metals. This category includes only in-situ production from ore bodies that have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class 5.
   (b) Solution Mining Well. These wells are used in the solution mining of salts or potash.
   (c) Sulfur Mining Well. These wells are used in the mining of sulfur by the Frasch process.

(4) Class 4. No person shall construct, use, or operate an injection well of this class. This class applies to injection wells that are used to inject hazardous wastes into or above a formation containing an underground source of drinking water and includes wells used by:

(a) generators of hazardous wastes or radioactive wastes; and
(b) owners of hazardous waste management facilities, or radioactive waste disposal sites.

(5) Class 5. This class applies to all injection wells not included in Class 1, 2, 3, 4, or 6.

(a) The construction, use, or operation of the following Class 5 injection well types is prohibited. A description of the primary function for these prohibited Class 5 wells is as follows:

(i) Agricultural Drainage Well. These wells receive irrigation tailwaters, other field drainage, animal yard, feedlot, or dairy runoff;

(ii) Air Scrubber Waste Disposal Well. These wells are used to inject wastes from air scrubbers;

(iii) Gaseous Hydrocarbon Storage Well. These wells are used for the storage of hydrocarbons that are gases at standard temperature and pressure;

(iv) Groundwater Aquaculture Return Flow Well. These wells inject groundwater or surface water that has been used to support aquaculture;

(v) In-situ Fossil Fuel Recovery Well. These wells are used for the in-situ recovery of coal, lignite, oil shale, and tar sands;

(vi) Mining, Sand, or Other Backfill Well. These wells are used to inject a mixture of fluid and sand, mill tailings, and other solids into mined out portions of subsurface mines, whether the injectant is a radioactive waste or not. This also includes wells used to control mine fires and acid mine drainage wells;

(vii) Motor Vehicle Waste Disposal Well. These wells receive wastes from motor vehicle facilities and include autobody repair shops, new and used car dealerships, specialty repair shops, such as transmission, muffler, and radiator repair shops and any facility that steam cleans or otherwise washes undercarriages or engine parts or does any vehicular repair work;

(viii) Sewage or Wastewater Disposal Well. These wells are used to inject sewage or wastewater from any source to the groundwaters of the State. This includes cesspools and abandoned drinking water wells;

(ix) Solution Mining Well. These wells are used in solution mining in conventional mines, such as stopes leaching;

(x) Special Drainage Well. These wells are used for disposing of water from sources other than direct precipitation. Examples of this well type include: landslide control drainage wells, water tank overflow drainage wells, swimming pool drainage wells, and lake control drainage wells; and

(xi) Water Softener Regeneration Brine Disposal Well. These wells are used to inject regeneration wastes from water softeners.

(b) The construction, use, or operation by an individual of the following Class 5 injection well types may be approved by the Director provided that the injected material does not contain any waste or any substance of a composition and concentration such that, if it were discharged to the land or waters of the State, would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage:

(i) Aquifer Recharge Wells specified in Rule .0218 of this Section;

(ii) Aquifer Storage and Recovery Wells specified in Rule .0219 of this Section;

(iii) Aquifer Test Wells specified in Rule .0220 of this Section;

(iv) Experimental Technology Wells specified in Rule .0221 of this Section;

(v) Geothermal Aqueous Closed-Loop Wells specified in Rule .0222 of this Section;

(vi) Geothermal Direct Expansion Closed-Loop Wells specified in Rule .0223 of this Section;

(vii) Geothermal Heating/Cooling Water Return Wells specified in Rule .0224 of this Section;

(viii) Groundwater Remediation Wells specified in Rule .0225 of this Section;

(ix) Salinity Barrier Wells specified in Rule .0226 of this Section;

(x) Stormwater Drainage Wells specified in Rule .0227 of this Section;

(xi) Subsidence Control Wells specified in Rule .0228 of this Section;

(xii) Tracer Wells specified in Rule .0229 of this Section; and

(xiii) Other Wells specified in Rule .0230 of this Section;

(6) Class 6. No person shall construct, use, or operate an injection well of this class. This class applies to wells that are used for containment of a gaseous, liquid, or supercritical carbon dioxide stream in subsurface geologic formations.

History Note: *Authority G.S. 87-87; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0210 REQUIREMENTS: WELLS USED TO INJECT WASTE OR CONTAMINANTS

The owner of any well that has been used to inject wastes or contaminants, with the exception of wells permitted in accordance with this Section, shall take corrective action as specified in Rule .0206(b) of this Section.

History Note: *Authority G.S. 87-87; 87-88; 143-214.2; 143-215.1A;*
Eff. August 1, 1982;
Amended Eff. September 1, 1996; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0211 GENERAL PERMITTING REQUIREMENTS APPLICABLE TO ALL INJECTION WELL TYPES

(a) A permit shall be obtained from the Director prior to constructing, operating, or using any well for injection unless the well is deemed permitted in accordance with the rules of this Section. No permit shall be granted for the injection of wastes or any substance of a composition and concentration such that, if it were discharged to the land or waters of the state, it would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage unless specifically provided for by statute or by the rules in this Section.

(b) No person shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water if the presence of that contaminant would cause a violation of any applicable groundwater quality standard specified in Subchapter 02L or would otherwise adversely affect human health.

(c) If at any time the Director learns that any injection well may cause a violation of any applicable groundwater quality standard specified in 15A NCAC 02L that is not authorized by the rules of this Section, the Director shall do one of the following:

(1) require an individual permit for injection wells that are otherwise permitted by rule;

(2) require such actions as may be necessary to prevent the violation, including corrective action as required in Rule .0206 of this Section; or

(3) take enforcement action as provided for in G.S. 87-91, G.S. 87-94, or G.S. 87-95.

(d) All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purposes of this Section, a "responsible corporate officer" means a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

(3) For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official; and

(4) For all other persons: by the well owner, or his or her agent.

(e) The person signing the permit application shall certify that the data furnished on the application is accurate and that the injection well will be operated in accordance with the approved specifications and conditions of the permit.

(f) All reports shall be signed by a person described in Paragraph (d) of this Rule. All records, reports, and information required to be submitted to the Director and all public comment on these records, reports, or information shall be disclosed to the public unless the person submitting the information can show that such information, if made public, would disclose methods or processes entitled to protection as trade secrets as defined in G.S. 66-152. The Director shall determine which information is entitled to confidential treatment. If the Director determines that such information is entitled to be treated as confidential information as defined in G.S. 132-1.2, the Director shall take steps to protect such information from disclosure.

(g) The Director shall consider the cumulative effects of drilling and construction of multiple wells and operation of all proposed wells during evaluation of permit applications.
(h) All permits shall be issued for a period not to exceed five years from the date of issuance. Permits shall be deemed active until all permit requirements have been met and documentation has been received indicating that the wells meet one of the following conditions:
(1) the wells are temporarily or permanently abandoned in accordance with Rule .0240 of this Section;
(2) the wells have been converted to some other use; or
(3) the wells are permitted under another permit issued by the appropriate permitting authority for that activity.
(i) All facilities shall be operated and maintained to comply with the rules of this Section.
(j) The permittee shall allow the Director or an authorized representative, upon their presentation of credentials and other documents as may be required by law, to:
(1) enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records are required to be kept under the conditions of the permit;
(2) have access to and copy, during normal business hours of the establishment, any records that are required to be kept under the conditions of the permit;
(3) inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and
(4) sample or monitor for the purposes of assuring permit compliances or as otherwise authorized, any substances or parameters.
(k) The permit may be modified, revoked and reissued, or terminated by the Director in whole or part for actions that would adversely affect human health or the environment. Such actions may include:
(1) violation of any terms or conditions of the permit;
(2) obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or
(3) refusal of the permittee to allow authorized employees of the Division upon proper presentation of credentials to:
(A) enter upon permittee's premises on which a system is located where any records are required to be kept under terms and conditions of the permit;
(B) have access to and copy any records required to be kept under terms and conditions of the permit;
(C) inspect any monitoring equipment or method required in the permit; or
(D) collect any sample from the injection facility.
(l) The filing of an application by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance shall not stay any permit condition.
(m) The permittee shall furnish to the Director any information that the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. The permittee shall also furnish to the Director, upon request, copies of records required by the permit to be kept.
(n) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by the permit for a period of at least three years from the date of the sample, measurement, report, or application. Records of monitoring information shall include the:
(1) date, place, and time of sampling or measurements;
(2) individuals who performed the sampling or measurements;
(3) dates analyses were performed;
(4) individuals who performed the analyses;
(5) analytical techniques or methods used;
(6) results of any such sampling, measurements, and analyses; and
(7) description and date of any maintenance activities performed, including the name and contact information of the individuals performing such activities.
(o) The permit shall not be transferred to any person without the approval of the Director. A permit ownership or name change request shall be submitted to the Director.
(p) The permittee shall report any monitoring or other information that indicates:
(1) noncompliance with a specific permit condition;

(2) a contaminant may cause a violation of applicable groundwater quality standards specified in 15A NCAC 02L; and

(3) a malfunction of the injection system may cause the injected fluids to migrate outside the approved injection zone or area.

The information shall be provided to the Director orally within 24 hours of the permittee becoming aware of the occurrence and as a written submission within five days of the occurrence. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance including dates and times, the anticipated time it is expected to continue if the noncompliance has not been corrected, and all steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 40 CFR 144.52(a)(7); 40 CFR 145.11(a)(20);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; February 1, 1997; October 1, 1996; March 1, 1984;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0212 ADDITIONAL CRITERIA AND STANDARDS: CLASS II: CLASS III

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-214.2; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Repealed Eff. March 1, 1984.

15A NCAC 02C .0213 ADDITIONAL CRITERIA AND STANDARDS APPLICABLE TO CLASS 5 WELLS

15A NCAC 02C .0214 ABANDONMENT AND CHANGE-OF-STATUS

History Note: *Authority G.S. 87-87; 87-88; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. February 1, 1997; October 1, 1996; March 1, 1984;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0215 VARIANCE

15A NCAC 02C .0216 DELEGATION

History Note: *Authority G.S. 87-87(4); 87-88; 143-215.1A; 143-215.3(a)(1); 143-215.3(a)(4); 150B-23;*
Eff. September 1, 1996;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0217 PERMITTING BY RULE

(a) The following injection well systems shall be deemed to be permitted by the rules of this Section pursuant to G.S. 87-88(a) and it shall not be necessary for the Division to issue an individual permit for the construction or operation of the following injection well systems provided that the system does not result in the violation of any assigned surface water, groundwater, or air quality standard; there is no groundwater discharge of the injectant into surface waters; and all criteria for the specific systems are met:

(1) Aquifer Test Wells specified in Rule .0220 of this Section;

(2) Geothermal Aqueous Closed Loop Wells specified in Rule .0222 of this Section;

(3) Geothermal Direct Expansion Closed Loop Wells specified in Rule .0223 of this Section;

(4) Groundwater Remediation Wells specified in Rule .0225 of this Section; and

(5) Stormwater Drainage Wells specified in Rule .0227 of this Section.

(b) Any violation of groundwater standards not authorized by the rules of this Section shall be treated in accordance with Rule .0206 of this Section.

(c) An injection well system permitted by rule under the rules of this Section shall remain permitted by rule until such time as the Director determines that it shall not be deemed to be permitted. This determination shall be made based on compliance with the provisions of the rules of this Section.

(d) If the Director determines that an injection well system shall not be permitted by rule, the Director shall require the owner of the injection well system to obtain an individual permit.

History Note: *Authority G.S. 87-87; 87-88(a);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0218 AQUIFER RECHARGE WELLS

Aquifer Recharge Wells, which recharge depleted aquifers and inject uncontaminated water of equal or better quality than the aquifer being recharged, shall meet the requirements of Rule .0219 of this Section. However, the Director may impose additional requirements to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0219 AQUIFER STORAGE AND RECOVERY WELLS

(a) A permit shall be obtained from the Director prior to constructing, operating, or using an Aquifer Storage and Recovery Well. "Aquifer Storage and Recovery Well" means a well that is used to inject potable water for the purposes of subsurface storage and for later recovery of the injected water.

(b) Permit Applications. In addition to the permit requirements set forth in Rule .0211 of this Section, an application shall be submitted, in duplicate, to the Director on forms furnished by the Director and shall include the following:

(1) A site description that includes:
  (A) the name of the well owner or person otherwise legally responsible for the injection well, his or her mailing address and telephone number, and whether the owner is a federal, state, private, public, or other entity;
  (B) the name of the property owner, if different from the well owner, and his or her physical address, mailing address, and telephone number;
  (C) the name, mailing address, telephone number, and geographic coordinates of the facility for which the application is submitted; and
  (D) a list of all other injection permits associated with the subject facility.
(2) Project Description. A description of what problem the project is intended to solve or what objective the project is intended to achieve and shall include the following:
  (A) the history and scope of the problem or objective;
  (B) what is currently being done to solve the problem or achieve the objective;
  (C) why existing practices are insufficient to solve the problem or achieve the objective;
  (D) what other alternatives were considered to solve the problem or achieve the objective; and
  (E) how this option was determined to be the most effective or desirable to solve the problem or achieve the objective.
(3) Demonstration of Financial Responsibility as required in Rule .0208 of this Section.
(4) Injection Zone Determination. The applicant shall specify the horizontal and vertical portion of the injection zone within which the proposed injection activity will occur based on the hydraulic properties of that portion of the injection zone specified. No violation of groundwater quality standards specified in Subchapter 02L resulting from the injection shall occur outside the specified portion of the injection zone, as detected by a monitoring plan approved by the Director.
(5) Hydrogeologic Evaluation. If required by G.S. 89E, G.S. 89C, or G.S. 89F, a licensed geologist, professional engineer, or licensed soil scientist shall prepare a hydrogeologic evaluation of the facility to a depth that includes the injection zone determined in accordance with Subparagraph (4) of this Paragraph. A description of the hydrogeologic evaluation shall include all of the following:
  (A) regional and local geology and hydrogeology;
  (B) changes in lithology underlying the facility;
  (C) depth to the mean seasonal high water table;

(D) hydraulic conductivity, transmissivity, and storativity of the injection zone based on tests of site-specific material, including a description of the tests used to determine these parameters;

(E) rate and direction of groundwater flow as determined by predictive calculations or computer modeling; and

(F) lithostratigraphic and hydrostratigraphic logs of test and injection wells.

(6) Area of Review. The area of review shall be calculated using the procedure for determining the zone of endangering influence specified in 40 CFR 146.6(a), which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained electronically from the website of the Federal Register at https://www.ecfr.gov/cgi-bin/ECFR. The applicant shall identify all wells within the area of review that penetrate the injection or confining zone and repair or permanently abandon all wells that are improperly constructed or abandoned.

(7) Analyses of the injection zones including:

(A) test results of the native groundwater and the proposed recharge water for the parameters listed in Subparagraph (h)(4) of this Rule;

(B) geochemical analyses of representative samples of the aquifer matrix to determine the type and quantity of reactive minerals; and

(C) evaluation of the chemical compatibility of the native groundwater, injected water, and the aquifer matrix using site-specific geochemical data and hydraulic properties of the injection zones, and the results of any geochemical or hydrogeologic modeling. The chemical compatibility evaluation shall identify potential changes in groundwater quality resulting from the injection activities within the area of review specified in Subparagraph (6) of this Paragraph.

(8) Injection Procedure. The applicant shall submit a description of the proposed injection procedure that includes the following:

(A) the proposed average and maximum daily rate and quantity of injectant;

(B) the average maximum injection pressure expressed in units of pounds per square inch (psi);

(C) calculation of fracture pressures of confining units expressed in units of psi; and

(D) the total or estimated volume to be injected.

(9) Injection well construction details including:

(A) the number and depth of injection wells;

(B) an indication of whether the injection wells are existing or proposed;

(C) the depth and type of casing;

(D) the depth and type of screen material;

(E) the depth and type of grout; and

(F) the plans and specifications of the surface and subsurface construction of each injection well or well system.

(10) Monitoring Wells. Monitoring wells shall be located so as to detect any movement of injection fluids, process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (4) of this Paragraph. The monitoring schedule shall be consistent with the proposed injection schedule, pace of the anticipated reactions, and rate of transport of the injected fluid. The applicant shall submit a monitoring plan that includes the following:

(A) a list of monitoring parameters and analytical methods to be used;

(B) other parameters that may serve to indicate the progress of the intended reactions;

(C) a list of existing and proposed monitoring wells to be used; and

(D) a sampling schedule for monitoring the proposed injection.

(11) Well Data Tabulation. A tabulation of data on all existing or abandoned wells within the area of review of the injection wells that penetrate the proposed injection zone, including water supply wells, monitoring wells, and wells proposed for use as injection or monitoring wells. The data shall include a description of each well's type, depth, and record of abandonment or completion.

(12) Plan of Action. A proposed plan of action to be taken if the proposed injection operation causes fracturing of confining units, results in adverse geochemical reactions, or otherwise threatens groundwater quality.

(13) Maps and Cross-Sections. Scaled, site-specific site plans or maps depicting the location, orientation, and relationship of facility components including the following:

(A) area map based on the most recent USGS 7.5' topographic map of the area, at a scale of 1:24,000, and showing the location of the proposed injection site;

(B) topographic contour intervals showing all facility related structures, property boundaries, streams, springs, lakes, ponds, and other surface drainage features;

(C) all existing or abandoned wells within the area of review of the injection wells listed in the tabulation required in Subparagraph (11) of this Paragraph that penetrate the proposed injection zone, including water supply wells, monitoring wells, and wells proposed for use as injection wells;

(D) potentiometric surface maps of each hydrostratigraphic unit in the injection zone(s) that show the direction of groundwater movement, and all existing and proposed wells;

(E) cross-sections that show the horizontal and vertical extent of the injection zones, lithostratigraphic units, hydrostratigraphic units, and all existing and proposed wells, complete with casing and screen intervals; and

(F) all existing sources of potential or known groundwater contamination, including waste storage, treatment, or disposal systems within the area of review of the injection well or well system.

(14) Any other information necessary for the Director to ensure compliance with G.S. 87-84.

(c) Injection Volumes. The Director may establish maximum injection volumes and pressures necessary to assure that:

(1) fractures are not initiated in the confining zones;

(2) injected fluids do not migrate outside the injection zone or area;

(3) injected fluids do not cause or contribute to the migration of contamination into uncontaminated areas; and

(4) there is compliance with operating requirements.

(d) Injection.

(1) Injection may not commence until construction is complete, the permittee has submitted notice of completion of construction to the Director, and the Director has inspected or reviewed the injection well and finds it in compliance with the permit conditions. If the permittee has not received notice from the Director of intent to inspect or otherwise review the injection well within 10 days after the Director receives the notice, the permittee may commence injection.

(2) Prior to granting approval for the operation, the Director shall consider the following information:

(A) all available logging and testing data on the well;

(B) a demonstration of mechanical integrity pursuant to Rule .0207 of this Section;

(C) the proposed operating procedures;

(D) the results of the formation testing program; and

(E) the status of corrective action on defective wells in the area of review.

(e) Well Construction.

(1) Wells shall not be located:

(A) where surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscapes that will concentrate water around the well;

(B) if a person would be required to enter confined spaces to perform sampling and inspection activities; or

(C) if injectants or formation fluids would migrate outside the approved injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule.

(2) The methods and materials used in construction shall not threaten the physical or mechanical integrity of the well during its lifetime and shall be compatible with the proposed injection activities.

(3) The well shall be constructed in such a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus either during or after construction.

(4) The borehole shall not penetrate to a depth greater than the depth at which injection will occur unless the purpose of the borehole is the investigation of the geophysical and geochemical characteristics of an aquifer. Following completion of the investigation, the borehole beneath the zone of injection shall be completely grouted to prevent the migration of any contaminants.

(5) Drilling fluids and additives shall contain only potable water and may be comprised of one or more of the following:
  (A) the formation material encountered during drilling;
  (B) materials manufactured specifically for the purpose of borehole conditioning or well construction; or
  (C) materials approved by the Director, based on a demonstration of not adversely affecting human health or groundwater quality.

(6) Only grouts listed under Rule .0107 of this Subchapter shall be used with the exception that bentonite grout shall not be used:
  (A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction; or
  (B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(7) The annular space between the borehole and casing shall be grouted:
  (A) with a grout that is non-reactive with the casing or screen materials, the formation, or the injectant;
  (B) from land surface to the top of the gravel pack and in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation of groundwater quality in any aquifer or zone; and
  (C) so that the grout extends outward from the casing wall to a thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; but in no case shall a well be required to have an annular grout seal thickness greater than four inches.

(8) Grout shall be emplaced around the casing by one of the following methods:
  (A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface;
  (B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the annular space that can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application; or
  (C) Other. Grout may be emplaced in the annular space by gravity flow to ensure complete filling of the space. Gravity flow shall not be used if water or any visible obstruction is present in the annular space at the time of grouting.

(9) All grout mixtures shall be prepared prior to emplacement per the manufacturer's directions with the exception that bentonite chips or pellets may be emplaced by gravity flow if water is present or the chips or pellets are otherwise hydrated in place.

(10) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.

(11) The well shall be grouted within seven days after the casing is set or before the drilling equipment leaves the site, whichever occurs first. If the well penetrates any water-bearing zone that contains saline water, the well shall be grouted within one day after the casing is set.

(12) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(13) A casing shall be installed that extends from at least 12 inches above land surface to the top of the injection zone.

(14) Wells with casing extending less than 12 inches above land surface shall be approved by the Director only when one of the following conditions is met:
  (A) site specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; or
  (B) it is not operationally feasible for the well head to be completed 12 inches above land surface due to the engineering design requirements of the system.

(15) Multi-screened wells shall not connect aquifers or zones having differences in water quality that would result in a degradation of groundwater quality in any aquifer or zone.

(16) Prior to removing the equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85, to preclude contaminants from entering the well.

(17) Packing materials for gravel-and sand-packed wells shall be:
  (A) composed of quartz, granite, or other hard, non-reactive rock material;

(B) of uniform size, water-washed and free from clay, silt, and toxic materials;
(C) disinfected prior to subsurface emplacement;
(D) emplaced such that it will not connect aquifers or zones having differences in water quality that would result in the deterioration of groundwater quality in any aquifer or zone;
(E) evenly distributed around the screen and shall extend to a depth at least one foot above the top of the screen. A one-foot or greater thick seal, comprised of bentonite clay, shall be emplaced directly above and in contact with the packing material.

(18) Each injection well shall have a well identification plate that meets the criteria specified in Rule .0107 of this Subchapter.

(19) A hose bibb, sampling tap, or other collection equipment shall be installed on the line entering the injection well such that a sample of the injectant can be obtained prior to its entering the injection well.

(20) If applicable, all piping, wiring, and vents shall enter the well through the top of the casing unless it is based on a design demonstrated to preclude surficial contaminants from entering the well.

(21) The well head shall be completed in such a manner as to preclude surficial contaminants from entering the well, and well head protection shall include:
(A) an accessible external sanitary seal installed around the casing and grouting; and
(B) a water-tight cap or seal compatible with the casing and installed so that it cannot be removed without the use of hand or power tools.

(f) Testing.

(1) Well logs and other tests conducted during the drilling and construction of the wells shall be submitted to the Director after completion of well construction. A descriptive report interpreting the results of such logs and tests shall be prepared by a log analyst and submitted to the Director after completion of the tests. The accuracy and usefulness of the logs and tests shall be determined by the Director based on the intended function, depth, construction, and other characteristics of the well, and availability of similar data in the area of the drilling site. Such logs and tests shall include:
(A) lithostratigraphic logs of the entire borehole;
(B) hydrosratigraphic logs of the entire borehole; and
(C) deviation checks conducted on all holes where pilot holes and reaming are used at sufficiently frequent intervals to assure that vertical avenues for fluid migration through diverging holes are not created during drilling.

(2) When the injection zone is a water-bearing formation, the following information concerning the injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule shall be submitted to the Director:
(A) fluid pressure;
(B) fluid temperature;
(C) fracture pressure;
(D) other physical and chemical characteristics of the injection zone;
(E) physical and chemical characteristics of the formation fluids; and
(F) compatibility of injected fluids with formation fluids.

(3) When the injection formation is not a water bearing formation, only the fracture pressure and other physical and chemical characteristics of the injection zone shall be determined or calculated and submitted to the Director after completion of the determinations.

(4) Tests for mechanical integrity shall be conducted prior to operation and every 10 years thereafter in accordance with Rule .0207 of this Section. The Director may require more frequent mechanical integrity testing as set out in Rule .0207 of this Section.

(g) Operation and Maintenance.

(1) Pressure at the well head shall be limited to a maximum that will ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) There shall be no injection between the outermost casing and the well borehole.

(3) Monitoring of the operating processes at the well head and protection against damage of the well head during construction and use shall be provided for by the well owner.

(h) Monitoring.

(1) Monitoring of the groundwater quality by the permittee shall be required by the Director to demonstrate protection of the groundwaters of the State.

(2) In determining the type, density, frequency, and scope of monitoring, the Director shall consider the following:

(A) physical and chemical characteristics of the injection zone;

(B) physical and chemical characteristics of the injected fluids;

(C) volume and rate of discharge of the injected fluids;

(D) compatibility of the injected fluids with the formation fluids;

(E) the number, type, and location of all wells, mines, surface bodies of water, and structures within the area of review;

(F) proposed injection procedures;

(G) expected changes in pressure, formation fluid displacement, and direction of movement of injected fluid;

(H) proposals of corrective action to be taken in the event of a failure in any phase of injection operations that renders the groundwaters unsuitable for their best intended usage as defined in Rule .0204 of this Section; and

(I) the life expectancy of the injection operations.

(3) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(4) The following analytical parameters shall be included:

(A) disinfectants and disinfection byproducts;

(B) radium, radionuclides, and gross alpha radiation;

(C) Reduction Potential (Eh), pH, Total Dissolved Solids (TDS), Biological Oxygen Demand (BOD), Total Oxygen Demand (TOD), Chemical Oxygen Demand (COD), temperature, conductivity, and dissolved oxygen;

(D) coliform, Escherichia coli (E. Coli), Giardia, and Cryptosporidium;

(E) parameters based on the source water, injection zone formation materials, native groundwater, and any other parameters necessary for the Department to ensure compliance with G.S. 87-84; and

(F) other parameters for which National Primary and Secondary Drinking Water Standards have been established.

(5) Analysis of the physical, chemical, biological, or radiological characteristics of the injected fluid shall be made monthly or more frequently, as necessary in order to provide representative data for characterization of the injectant.

(6) Continuous recording devices to monitor the injection pressure, flow, rate, and volume of injected fluid shall be installed.

(7) Monitoring wells associated with the injection site shall be monitored quarterly or on a schedule determined by the Director to detect any migration of injected fluids from the injection zone to ensure compliance with G.S. 87-84.

(8) Monitoring wells completed in the injection zone and adjacent to the injection zone may be affected by the injection operations. If affected, the Director may require additional monitor wells be installed outside the injection zone to detect any movement of injection fluids, process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule. If the operation is affected by subsidence or catastrophic collapse, additional monitoring wells shall be located so that they will not be physically affected and shall be of an adequate number to detect movement of injected fluids, process byproducts, or formation fluids outside the injection zone or area. In determining the number, location, and spacing of monitoring wells, the following criteria shall be considered by the Director:

(A) the population relying on the groundwater resource affected, or potentially affected, by the injection operation;

(B) the proximity of the injection operation to points of withdrawal of groundwater;

(C) the local geology and hydrology;

(D) the operating pressures;

(E) the chemical characteristics and volume of the injected fluid, formation water, and process by products; and
(F) the number of existing injection wells.

(i) Reporting.
(1) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.
(2) All sampling results shall be reported to the Division quarterly or at another frequency determined by the Director based on the reaction rates, injection rates, likelihood of secondary impacts, and site-specific hydrogeologic information.
(3) The results of each test required in Paragraph (f) of this Rule shall be submitted to the Director within 30 days of the completion of the test.

(j) Public Notice. Public notice of intent to issue permits for applications submitted pursuant to this Rule shall be given prior to permit issuance.
(1) Such notice shall:
(A) be posted on the Division website and given in press releases via media outlets having coverage within the area of review;
(B) provide 30 days for public comments to be submitted to the Director; and
(C) include a description of details of the project, such as the permit applicant; the location, number, and depth of injection wells; and the injectant type, source, and volume.
(2) After the public comment period has ended the Director shall:
(A) consider the comments submitted and determine if a public hearing is warranted;
(B) determine if the draft permit shall be issued, modified, or denied; and
(C) post notice on the Division website as of the final permitting action, which shall include the issued permit or the reason for denial if the permit was denied.
(3) In determining if a public hearing is warranted, the Director's consideration shall include the following:
(A) requests by property owners within the area of review;
(B) potential harm to the public by not having a public hearing;
(C) potential harm to the applicant due to the delay in having a public hearing; and
(D) the likelihood of obtaining new information regarding the proposed injection.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0220 AQUIFER TEST WELLS

(a) "Aquifer Test Wells" means wells used to inject uncontaminated fluid into an aquifer to determine the aquifer characteristics.
(b) Injection wells of this type shall be permitted by rule when constructed and operated in accordance with this Rule.
(c) Only potable water shall be injected through this type of injection well.
(d) Tests for mechanical integrity shall be conducted in accordance with Rule .0207 of this Section.
(e) Injection wells of this type shall be constructed in accordance with the well construction standards applicable to monitoring wells specified in Rule .0108 of this Subchapter;
(f) The operation of the aquifer test well shall not cause contaminated groundwater to migrate into an area not contaminated prior to initiation of injection activities or cause a violation of applicable groundwater quality standards as specified in 15A NCAC 02L.
(g) Within 30 days of a change of status of the well, the owner/operator shall provide the following information:
(1) facility name, address, and location indicated by either:
(A) latitude and longitude with reference datum, position accuracy, and method of collection; or
(B) a facility site map with property boundaries;

(2) name, telephone number, and mailing address of person responsible for installation or operation of the well;
(3) ownership of facility as a private individual or organization or a federal, State, county, or other public entity;
(4) number of injection wells and their construction details; and
(5) well status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

(h) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0221 EXPERIMENTAL TECHNOLOGY WELLS

"Experimental Technology Wells" means wells used in experimental or unproven technologies whose operation complies with all applicable rules and statutes. Experimental Technology Wells shall comply with the rules governing the injection well types in Rule .0209(5)(b) of this Section that most closely resembles the Experimental Technology Well's hydrogeologic complexity and potential to adversely affect groundwater quality.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0222 GEOTHERMAL AQUEOUS CLOSED-LOOP WELLS

(a) "Geothermal Aqueous Closed-Loop Wells" means wells that house a subsurface system of closed-loop pipe that circulates potable water only or a mixture of potable water and performance-enhancing additives such as antifreeze, corrosion inhibitors, or scale inhibitors for heating and cooling purposes. Only additives that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health in compliance with G.S. 130A-5 shall be used.

(b) Permitted by Rule. Aqueous Closed-Loop Geothermal Wells are permitted by rule when constructed and operated in accordance with the rules of this Section.

(c) Individual Permits. If an individual permit is required pursuant to Rule .0217 of this Section, then an application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Notification. In addition to the requirements set forth in Rule .0211 of this Section, notification for systems designed to serve a single family residence shall be submitted two or more business days prior to construction and at least 30 days for all other installations. The notification shall be submitted to the Director and to the county health department. The notification shall be made using one form per facility supplied by the Director and shall include:

(1) the well owner's name, address, telephone number, email address (if available), and whether the owner is a federal, State, private, public, or other entity. If the well operator is different from the owner then the same information shall be provided for the well operator;
(2) the physical location of the well facility;
(3) a description of the proposed injection activities;
(4) a scaled, site-specific map showing the following:
    (A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed in Subparagraph (e)(5) of this Rule within 250 feet of the proposed injection wells;
    (B) property boundaries within 250 feet of the parcel where the proposed wells are located; and
    (C) an arrow orienting the site to one of the cardinal directions;
(5) the types and concentrations of additives, if any, to be used in the closed-loop geothermal well system. Only additives approved by the Department of Health and Human Services shall be used in any closed loop geothermal well system;

(6) plans and specifications of the surface and subsurface construction details of the system;
(7) the heating and cooling system installation contractor's name and certification number, address, email address (if available), and telephone number;
(8) a description of how the items identified in Part (d)(4)(A) of this Rule will be protected during well construction; and
(9) any other information necessary for the Department to ensure compliance with G.S. 87-84.

(e) Well Construction.
(1) Only tubing that meets the specifications in Chapter 12 of the North Carolina Mechanical Code shall be used, which is hereby incorporated by reference, including subsequent amendments and editions, and can be accessed at no cost at http://www.ncdoi.com/osfm/.
(2) Drilling fluids and water produced during well construction shall be managed to prevent direct discharges to surface waters as well as violations of groundwater and surface water quality standards. Plans for such preventive measures shall be retained onsite throughout the construction process.
(3) The well shall be constructed in a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus at any time during or after construction.
(4) The well shall be located such that:
(A) the injection well is not in an area where surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscape features that will concentrate water around the well; and
(B) the injection well is not in an area that requires a person to enter confined spaces to perform sampling and inspection activities.
(5) The horizontal separation between the geothermal aqueous closed-loop well and potential sources of groundwater contamination that exist at the time the wells are constructed shall be no less than as follows:
(A) Building perimeters, including any attached structures for which a building permit is required, such as garages, patios, or decks, regardless of foundation construction type 15 feet
(B) Septic systems, including drainfield, waste application area, and repair area 50 feet
(C) Industrial or municipal sewage or liquid waste collection or transmission sewer mains constructed to water main standards as stated in the American Water Works Association (AWWA) Standards C600 and/or C900 15 feet
(D) Water-tight sewer lateral lines from a residence or other non-public system to a sewer main or other wastewater disposal system 15 feet
(E) Other industrial or municipal sewage or liquid waste collection or transmission sewer mains 25 feet
(F) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N with secondary containment 50 feet
(G) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N without secondary containment 100 feet
(H) Above ground or underground storage tanks that contain petroleum fuels used for heating equipment, boilers, or furnaces, except for tanks used solely for storage of propane, natural gas, or liquefied petroleum gas 50 feet
(I) Land-based or subsurface waste storage or disposal systems 50 feet
(J) Gravesites 50 feet
(K) Any other potential sources of contamination 50 feet
(6) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well and any tubing during its lifetime and shall be compatible with the proposed injection activities.
(7) Drilling fluids shall contain only potable water and may be comprised of one or more of the following:
(A) the formation material encountered during drilling; and
(B) materials manufactured specifically for the purpose of borehole conditioning or well construction.

(8) Thermally enhanced bentonite slurry grout shall be used. This grout shall consist of a mixture of not more than 22 gallons of potable water, one 50-pound bag of thermally enhanced commercial Wyoming sodium bentonite, and up to 400 pounds of clean dry 50-70 mesh silica sand. The amount of silica sand may be varied to achieve the thermal conductivity desired of the grout. The thermally enhanced grout slurry shall only be used in accordance with the manufacturers written instructions and shall meet permeability standards in accordance with Rule .0107 of this Subchapter.

(9) Bentonite grout shall not be used:

(A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction; or

(B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(10) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(11) Grout shall be placed the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.

(12) The grout shall be emplaced by one of the following methods:

(A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the borehole or annular space around the casing and overflows at the surface; or

(B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the borehole or annular space which can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application.

(13) If temporary outer casing is installed, it shall be removed during grouting of the borehole in a way that maintains the integrity of the borehole and uniform grout coverage around the geothermal tubing.

(14) If a permanent outer casing is installed:

(A) The space between the interior wall of the casing and the geothermal tubing shall be grouted the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection;

(B) The annular space between the casing and the borehole shall be grouted with a grout that is non-reactive with the casing or the formation;

(C) Grout shall extend outward in all directions from the casing wall to borehole wall and have a thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; and

(D) In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(15) Grout emplacement shall not threaten the physical or mechanical integrity of the well.

(16) The well shall be grouted within seven days after drilling is complete or before the drilling equipment leaves the site, whichever occurs first. If the well penetrates any water-bearing zone that contains contaminated or saline water, the well shall be grouted within one day after the casing is set.

(17) Prior to removing the equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85, to preclude contaminants from entering the well.

(18) Well head completion shall be conducted in a manner so as to preclude surficial contaminants from entering the well.

(f) Well Location. The location of each well boring and appurtenant underground piping leading to all heat exchangers shall be identifiable such that they may be located, repaired, and abandoned as necessary after construction.

(1) The as-built locations of each well boring, header pit, and appurtenant underground piping shall be recorded on a scaled site-specific facility map, which shall be retained onsite and distributed as specified in Subparagraph (i)(1) of this Rule.

(2) Each well boring and header pit shall be located by a North Carolina registered land surveyor, a GPS receiver, or by triangulation from at least two permanent features on the site, such as building foundation corners or property boundary iron pins.

(3) Well boring and appurtenant underground piping locations shall be identifiable in the field by tracer wire and warning tape, concrete monuments, or any other method approved by the Director upon a demonstration that such a method provides a reliable and accurate method of detection.

(4) If tracer wire and warning tape are used, then tracer wire consisting of copper wire of at least 14 gauge shall be placed adjacent to all horizontal piping during pipe installation, and warning tape shall be installed directly above the horizontal piping approximately 12 inches below final grade.

(5) If concrete monuments are used, then each monument shall be located directly above each individual well, at the perimeter corners of each well field, or in the center of each well cluster. Each concrete monument shall be permanently affixed with an identification plate constructed of durable, weatherproof, rustproof metal or other material approved by the Director as equivalent, which shall be stamped with the following information:

(A) well contractor name and certification number;

(B) number and depth of the borings;

(C) grout depth interval;

(D) well construction completion date; and

(E) identification as a geothermal well or well field.

(g) Testing.

(1) Closed loop tubing shall pass a pressure test on-site prior to installation into the borehole. Any closed loop tubing that fails the pressure test shall either not be used or shall pass a subsequent pressure test prior to installation and after all leaks have been located and repaired.

(2) The closed loop well system shall pass a pressure test after installation and prior to operation. Any pressure fluctuation other than that due to thermal expansion and contraction of the testing medium shall be considered a failed test. Any leaks shall be located and repaired prior to operating the system.

(h) Operation.

(1) The well shall be protected against damage during construction and use.

(2) The well shall be operated and maintained in accordance with the manufacturer's specifications throughout its operating life.

(i) Monitoring and Reporting.

(1) The well owner shall submit the as-built well locations as documented in accordance with Paragraph (f) of this Rule to the Director and the appropriate county health department. The well owner shall also record these documents with the register of deeds of the county in which the facility is located.

(2) Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner or owners.

(3) The Director may require any monitoring necessary to ensure compliance with G.S. 87-84.

(4) The permitee shall report any leaks to the Division during the lifetime of the well.

(5) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0223 GEOTHERMAL DIRECT EXPANSION CLOSED-LOOP WELLS

(a) "Geothermal Direct Expansion Closed-Loop Wells" means wells used to house a subsurface system of closed-loop pipe that circulates refrigerant gas for heating and cooling purposes. Only gasses that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health in compliance with G.S. 130A-5 shall be used.

(b) Permitted by Rule. Direct Expansion Closed-Loop Geothermal Wells are permitted by rule when constructed and operated in accordance with the rules of this Section.

(c) Individual Permits. If an individual permit is required pursuant to Rule .0217 of this Section, then an application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Notification. In addition to the requirements set forth in Rule .0211 of this Section, notification for systems designed to serve a single family residence shall be submitted two or more business days prior to construction and

30 days or more for all other installations. The notification shall be submitted to the Director and to the county health department. The notification shall be made using one form per operation supplied by the Director and shall include:

(1) the well owner's name, address, telephone number, email address (if available), and whether the owner is a federal, State, private, public, or other entity. If the well operator is different from the owner then the same information shall be provided for the well operator;
(2) the physical location of the well;
(3) a description of the proposed injection activities;
(4) a scaled, site specific map showing the following:
  (A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed in Subparagraph (e)(6) of this Rule within 250 feet of the proposed injection wells;
  (B) property boundaries within 250 feet of the parcel where the proposed wells are located; and
  (C) an arrow orienting the site to one of the cardinal directions;
(5) the type of gas to be used in the closed-loop geothermal well system. Only approved gases shall be used in any closed loop geothermal well system;
(6) plans and specifications of the surface and subsurface construction details of the system;
(7) the heating and cooling system installation contractor's name and certification number, address, email address (if available), and telephone number;
(8) a description of how the items identified in Part (d)(4)(A) of this Rule will be protected during well construction; and
(9) any other information necessary for the Department to ensure compliance with G.S. 87-84.

(e) Well Construction.

(1) Only tubing that meets the specifications in Chapter 12 of the North Carolina Mechanical Code shall be used.
(2) All systems shall be constructed with cathodic protection unless testing conducted in accordance with Paragraph (g) of this Rule indicates that all pH test results are within the range of 5.5 to 11.0 standard units.
(3) Drilling fluids and water produced during well construction shall be managed to prevent direct discharges to surface waters and violations of groundwater and surface water quality standards. Plans for such preventive measures shall be retained onsite throughout the construction process.
(4) The well shall be constructed in a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus at any time during or after construction.
(5) The well shall be located such that:
  (A) the injection well is not in an area where surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscape features that will concentrate water around the well; and
  (B) the injection well is not in an area that requires a person to enter confined spaces to perform sampling and inspection activities.
(6) The horizontal separation between the geothermal direct expansion closed-loop well and potential sources of groundwater contamination that exist at the time the wells are constructed shall be no less than as follows:
  (A) Building perimeters, including any attached structures for which a building permit is required, such as garages, patios, or decks, regardless of foundation construction type 15 feet
  (B) Septic systems, including drainfield, waste application area, and repair area 50 feet
  (C) Industrial or municipal sewage or liquid waste collection or transmission sewer mains constructed to water main standards as stated in the American Water Works Association (AWWA) Standards C600 and/or C900 15 feet
  (D) Water-tight sewer lateral lines from a residence or other non-public system to a sewer main or other wastewater disposal system 15 feet
  (E) Other industrial or municipal sewage or liquid waste collection or transmission sewer mains 25 feet

(F) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N with secondary containment
50 feet

(G) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N without secondary containment 100 feet

(H) Above ground or underground storage tanks that contain petroleum fuels used for heating equipment, boilers, or furnaces, except for tanks used solely for storage of propane, natural gas, or liquefied petroleum gas
50 feet

(I) Land-based or subsurface waste storage or disposal systems 50 feet

(J) Gravesites 50 feet

(K) Any other potential sources of contamination 50 feet

(7) Angled boreholes shall not be drilled in the direction of underground petroleum or chemical storage tanks unless it can be demonstrated to the satisfaction of the Director that doing so will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L.

(8) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well during its lifetime and shall be compatible with the proposed injection activities.

(9) Drilling fluids shall contain only potable water and may be comprised of one or more of the following:
(A) the formation material encountered during drilling; and
(B) materials manufactured specifically for the purpose of borehole conditioning or well construction.

(10) Thermally enhanced bentonite slurry grout shall be used. This grout shall consist of a mixture of not more than 22 gallons of potable water, one 50-pound bag of thermally enhanced commercial Wyoming sodium bentonite, and up to 400 pounds of clean dry 50-70 mesh silica sand. The amount of silica sand maybe varied to achieve the thermal conductivity desired of the grout. The thermally enhanced grout slurry shall only be used in accordance with the manufacturers written instructions.

(11) Bentonite grout shall not be used:
(A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction; or
(B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(12) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(13) Grout shall be placed the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.

(14) The grout shall be emplaced by one of the following methods:
(A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the borehole or annular area space the casing and overflows at the surface; or
(B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the borehole or annular space which can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application.

(15) If temporary outer casing is installed, it shall be removed during grouting of the borehole in a way that maintains the integrity of the borehole and uniform grout coverage around the geothermal tubing.

(16) If a permanent outer casing is installed:
(A) The space between the interior wall of the casing and the geothermal tubing shall be grouted the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.
(B) The annular space between the casing and the borehole shall be grouted with a grout that is non-reactive with the casing or the formation.

(C) Grout shall extend outward in all directions from the casing wall to borehole wall and have a thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; and

(D) In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(17) Grout emplacement shall not threaten the physical or mechanical integrity of the well.

(18) The well shall be grouted within seven days after drilling is complete or before the drilling equipment leaves the site, whichever occurs first. If the well penetrates any water-bearing zone that contains contaminated or saline water, the well shall be grouted within one day after the casing is set.

(19) Prior to removing the equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85, to preclude contaminants from entering the well.

(20) Well head completion shall be conducted in a manner so as to preclude surficial contaminants from entering the well.

(f) Well Location. The location of each well boring and appurtenant underground piping leading to all heat exchangers shall be identifiable such that they may be located, repaired, and abandoned as necessary after construction.

(1) The as-built locations of each well boring, header pit, and appurtenant underground piping shall be recorded on a scaled site-specific facility map, which shall be retained onsite and distributed as specified in Subparagraph (i)(1) of this Rule.

(2) Each well boring and header pit shall be located by a North Carolina registered land surveyor, a GPS receiver, or by triangulation from at least two permanent features on the site, such as building foundation corners or property boundary iron pins.

(3) Well boring and appurtenant underground piping locations shall be identifiable in the field by tracer wire and warning tape, concrete monuments, or any other method approved by the Director upon a demonstration that such a method provides a reliable and accurate method of detection.

(4) If tracer wire and warning tape are used, then tracer wire consisting of copper wire of at least 14 gauge shall be placed adjacent to all horizontal piping during pipe installation, and warning tape shall be installed directly above the horizontal piping approximately 12 inches below final grade.

(5) If concrete monuments are used, then each monument shall be located directly above each individual well, at the perimeter corners of each well field, or in the center of each well cluster. Each concrete monument shall be permanently affixed with an identification plate constructed of durable, weatherproof, rustproof metal or other material approved by the Director as equivalent, which shall be stamped with the following information:

(A) well contractor name and certification number;

(B) number and depth of the borings;

(C) grout depth interval;

(D) well construction completion date; and

(E) identification as a geothermal well or well field.

(g) Testing.

(1) Closed loop tubing shall pass a pressure test on-site prior to installation into the borehole. Any closed loop tubing that fails the pressure test shall either not be used or shall pass a subsequent pressure test prior to installation and after all leaks have been located and repaired.

(2) The closed loop well system shall pass a pressure test after installation and prior to operation. Any pressure fluctuation other than that due to thermal expansion and contraction of the testing medium shall be considered a failed test. Any leaks shall be located and repaired prior to operating the system.

(3) When not providing cathodic protection as specified in Subparagraph (e)(2) of this Rule drilling cuttings shall be tested for pH at a frequency of at least every 10 feet of boring length using a pH meter that has been calibrated prior to use according to the manufacturer's instructions.

(h) Operation.

(1) The well shall be protected against damage during construction and use.

(2) The well shall be operated and maintained in accordance with the manufacturer's specifications throughout its operating life. Cathodic protection, if required, shall be maintained at all times in accordance with the manufacturer's specifications throughout the operating life of the wells.

(i) Monitoring and Reporting.

(1) The well owner shall submit the as-built well locations as documented in accordance with Paragraph (f) of this Rule to the Director and the appropriate county health department. The well owner shall also record these documents with the register of deeds of the county in which the facility is located.
(2) Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner or owners.
(3) The Director may require any monitoring necessary to ensure compliance with G.S. 87-84.
(4) The permitee shall report any leaks to the Division during the lifetime of the well.
(5) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0224 GEOTHERMAL HEATING AND COOLING WATER RETURN WELLS

(a) "Geothermal Heating and Cooling Water Return Wells" means wells that reinject groundwater used to provide heating or cooling for structures. These wells shall not be approved by the Director unless the temperature of the injection fluid does not exceed 30 degrees Fahrenheit above or below the naturally occurring temperature of the receiving groundwater, including wells using a geothermal fluid source. No Geothermal Heating and Cooling Water Return Well shall be constructed, repaired, or operated without a permit.

(b) Permit Applications. In addition to the permit requirements set forth in Rule .0211 of this Section, an application shall be submitted, in duplicate, to the Director made using one form per operation supplied by the Director and shall include the following:

(1) the well owner's name, address, telephone number, email address (if available), and whether the owner is a federal, State, private, public, or other entity. If the well operator is different from the owner, then the same information shall be provided for the well operator;
(2) the physical address of the location of the well site if different than the well owner's mailing address;
(3) a description of the injection activities proposed by the applicant;
(4) a scaled, site-specific map showing at a minimum, the following:
    (A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed under Rule .0107 of this Subchapter within 250 feet of the proposed injection wells;
    (B) property boundaries within 250 feet of the parcel on which the proposed wells are located; and
    (C) an arrow orienting the site to one of the cardinal directions;
(5) the proposed average and maximum daily injection rate, volume, pressure, temperature, and quantity of fluid to be injected;
(6) plans and specifications of the surface and subsurface construction details of the system including a schematic of the injection and source wells construction;
(7) the heating and cooling system installation contractor's name, address, email address (if available), and telephone number; and
(8) any other information necessary for the Department to ensure compliance with G.S. 87-84.

(c) Permit Renewals. Application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Well Construction.

(1) A water supply well providing water for a separate geothermal heating and cooling injection well shall be constructed in accordance with the requirements of Rule .0107 of this Subchapter.
(2) A geothermal heating and cooling water return injection well constructed with a well screen shall also be constructed in accordance with the requirements of Rule .0107 of this Subchapter except that the entire length of the casing shall be grouted from the top of the sand or gravel pack to the land surface in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in the degradation of groundwater quality of any aquifer or zone.

(3) For open-end geothermal heating and cooling water return wells (also referred to as open-hole wells), the casing shall be grouted from the bottom of the casing to the land surface in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation groundwater quality of any aquifer or zone.

(4) The injection well system shall be constructed such that sampling taps or other collection equipment approved by the Director provides a functional source of water when the system is operational. Such equipment shall provide the means to collect a water sample after emerging from the water supply well (influent sample), and immediately prior to injection into the return well (effluent sample).

(e) Operation and Maintenance.

(1) Pressure at the well head shall be limited to ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) Injection between the outermost casing and the well borehole shall be prohibited.

(3) The well owner shall monitor the operating processes and protect the well against damage during construction and use.

(f) Monitoring and Reporting.

(1) Monitoring of any well may be required by the Director as necessary to ensure compliance with G.S. 87-84.

(2) The well owner shall retain copies of records of site maps showing the location of the injection wells and any testing, calibration, or monitoring information done on-site. Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner or owners.

(3) The permittee shall record the number and location of the wells with the register of deeds in the county in which the facility is located.

(4) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0225 GROUNDWATER REMEDIATION WELLS AND SYSTEMS

(a) "Groundwater Remediation Wells" means wells that are used to inject additives, treated groundwater, or ambient air for the treatment of contaminated soil or groundwater. Only additives that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health in compliance with G.S. 130A-5 shall be approved for injection.

(b) "Groundwater Remediation Systems" include infiltration galleries and injection wells. When on-site contaminated groundwater is used, the groundwater remediation injection wells shall be permitted in accordance with G.S. 143-215.1A.

(c) Permitted by Rule. The following are permitted by rule pursuant to Rule .0217 of this Section if constructed and operated in accordance with the rules of this Section, all criteria for the specific injection system are met, hydraulic or pneumatic fracturing are not conducted, and the injection wells or injection activities do not result in the violation of any groundwater or surface water standard outside the injection zone:

(1) Passive Injection Systems that use in-well delivery systems to diffuse injectants into the subsurface;

(2) Small-scale Injection Operations used to inject tracers or other additives to remediate contaminant plumes located within a land surface area not to exceed 10,000 square feet;

(3) Pilot Tests conducted to evaluate the technical feasibility of a remediation strategy in order to develop a full scale remediation plan for future implementation, if the surface area of the injection zone wells are located within an area that does not exceed five percent of the land surface above the known extent of groundwater contamination. A pilot test may involve multiple injection wells, injection events, and injectants within the specified area. An individual permit shall be required to conduct more than one pilot test on any separate groundwater contaminant plume;

(4) Air Injection Wells used to inject ambient air to enhance in-situ treatment of groundwater and that meet the following requirements:
    (A) The air to be injected shall not exceed the ambient air quality standards set forth in 15A NCAC 02D .0400 and shall not contain petroleum or any other constituent that would cause a violation of groundwater standards specified in Subchapter 02L; and
    (B) Injection wells of this type shall be constructed in accordance with the well construction standards applicable to monitoring wells specified in Rule .0108 of this Subchapter.
(5) In-situ thermal (IST) well systems shall meet the following requirements:
    (A) Any IST systems used shall not contain petroleum or any other constituent that would cause a violation of groundwater standards specified in Subchapter 02L; and
    (B) Injection wells of this type shall be constructed in accordance with the well construction standards applicable to monitoring wells specified in Rule .0108 of this Subchapter.

(d) Notification for Groundwater Remediation Wells described in Subparagraphs (c)(1) through (c)(3), and (c)(5) of this Rule shall be submitted to the Director two weeks prior to injection made using one form per facility supplied by the Director. Such notification shall include the following:
(1) the name and contact information of the well owner;
(2) the name and contact information of the person who can answer technical questions about the proposed injection system, if different from the well owner;
(3) geographic coordinates of the injection well or well field;
(4) maps of the injection zone indicating the known extent of contamination such as:
    (A) contaminant plume maps with isoconcentration lines that show the horizontal extent of the contaminant plume in soil and groundwater, existing and proposed monitoring wells, and existing and proposed injection wells; and
    (B) cross-sections to the known or projected depth of contamination that show the horizontal and vertical extent of the contaminant plume in soil and groundwater, changes in lithology, existing and proposed monitoring wells, and existing and proposed injection wells;
(5) the purpose, scope, and goals of the proposed injection activity;
(6) the name, volume, concentration, and Material Safety Data Sheet of each injectant;
(7) a schedule of injection well construction and injection activities;
(8) the plans and specifications of each injection well or well system, which include:
    (A) the number and depth of injection wells;
    (B) information on whether the injection wells are existing or proposed;
    (C) the well contractor name and certification number; and
    (D) information on of whether the injection wells are permanent wells, "direct push" temporary injection wells, or are subsurface distribution systems; and
(9) a description of a monitoring plan capable of determining if violations of groundwater quality standards specified in Subchapter 02L result from the injection activity.

(e) Notification for Air Injection Wells described in Subparagraph (c)(4) of this Rule shall be submitted to the Director two weeks prior to injection on forms supplied by the Director. Such notification shall include the following:
(1) the facility name, address, and location indicated by either:
    (A) the latitude and longitude with reference datum, position accuracy, and method of collection; or
    (B) a facility site map with property boundaries;
(2) the name, telephone number, and mailing address of the person responsible for installation or operation of the wells;
(3) the ownership of facility as a private individual or organization or a federal, State, county, or other public entity;
(4) the number of injection wells and their construction details; and
(5) the operating status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

(f) Permit Applications for all Groundwater Remediation Wells not Permitted by Rule. In addition to the permit requirements set forth in Rule .0211 of this Section, an application for all groundwater remediation wells not permitted by rule shall be submitted in duplicate to the Director made using one form per facility furnished by the Director and shall include the following:

(1) Site Description and Incident Information. The site description and incident information shall include the following:

(A) the name of the well owner or person otherwise responsible for the installation or operation of injection wells, mailing address, telephone number, and whether the owner is a federal, State, private, public, or other entity;

(B) the name of the property owner, if different from the well owner, physical address, mailing address, and telephone number;

(C) the name, mailing address, telephone number, geographic coordinates of the facility for which the application is submitted, a brief description of the nature of the business, and the status of the facility such as closed, still operating, or under construction;

(D) a description of the contamination incident including the source, type, cause, and release dates of the contamination; a list of all contaminants in the affected soil or groundwater; the presence and thickness of free product; and the maximum contaminant concentrations detected in the affected soil and groundwater;

(E) the State agency responsible for management of the contamination incident, including the incident tracking number, and the incident manager's name and telephone number; and

(F) a list of all permits issued for the facility or contamination incident, including Hazardous Waste Management program permits or approval under the Resource Conservation and Recovery Act (RCRA), waste disposal permits issued in accordance with G.S. 143-215.1, Sewage Treatment and Disposal Permits issued in accordance with G.S. 130A, and any other environmental permits required by State or federal law.

(2) Soils Evaluation (For Systems Treating On-Site Contaminated Groundwater Only). For systems with proposed discharge within seven feet of land surface and above the seasonal high water table, a soil evaluation of the disposal site shall be provided to the Division by the applicant. If required by G.S. 89F, a soil scientist shall submit this evaluation. If this evaluation is submitted, it shall include the following information:

[Note: The North Carolina Board for Licensing of Soil Scientists has determined, via letter dated December 1, 2005, that preparation of soils reports pursuant to this Paragraph constitutes practicing soil science under G.S. 89F.]

(A) Field description of soil profile. Based on examinations of excavation pits or auger borings, the following parameters shall be described by individual horizons to a depth of seven feet below land surface or to bedrock: thickness of the horizon; texture; color and other diagnostic features; structure; internal drainage; depth, thickness, and type of restrictive horizons; pH; cation exchange capacity; and presence or absence of evidence of any seasonal high water table. Applicants shall dig pits when necessary for evaluation of the soils at the site.

(B) Recommendations concerning annual and instantaneous loading rates of liquids, solids, other wastewater constituents, and amendments. Annual hydraulic loading rates shall be based on in-situ measurement of saturated hydraulic conductivity in the most restrictive horizon.

(3) Injection Zone Determination. The applicant shall specify the horizontal and vertical portion of the injection zone within which the proposed injection activity shall occur based on the hydraulic properties of that portion of the injection zone specified. No violation of groundwater quality standards specified in Subchapter 02L resulting from the injection shall occur outside the specified portion of the injection zone as detected by a monitoring plan approved by the Division. For systems treating on-site contaminated groundwater, computer modeling or predictive calculations based on site-specific conditions shall be provided to demonstrate that operation of the system shall not cause or contribute to the migration of contaminants into previously uncontaminated areas. This prescribed injection zone shall replace the compliance boundary as defined in 15A NCAC 2L .0107.

(4) A hydrogeologic evaluation of the disposal site to a depth that includes the injection zone determined in accordance with Subparagraph (3) of this Paragraph. If required by G.S. 89E, G.S. 89C, or G.S. 89F, a licensed geologist, professional engineer, or licensed soil scientist shall prepare a hydrogeologic evaluation of the facility. The hydrogeologic evaluation shall include all of the following:

(A) the regional and local geology and hydrogeology;

(B) the changes in lithology underlying the facility;
(C) the depth to bedrock;
(D) the depth to the mean seasonal high water table;
(E) the hydraulic conductivity, transmissivity, and storativity of the injection zone based on tests of site-specific material, including a description of the tests used to determine these parameters;
(F) the rate and direction of groundwater flow as determined by predictive calculations or computer modeling; and
(G) the lithostratigraphic and hydrostratigraphic logs of test and injection wells.

(5) Area of Review. The area of review shall be calculated using the procedure for determining the zone of endangering influence specified in 40 CFR 146.6(a). The applicant shall identify all wells within the area of review that penetrate the injection or confining zone and repair or permanently abandon all wells that are improperly constructed or abandoned.

(6) Injectant Information. The applicant shall submit the following information for each proposed injectant:
(A) the injectant name and manufacturer, concentration at the point of injection, and percentage if present in a mixture with other injectants;
(B) the chemical, physical, biological, or radiological characteristics necessary to evaluate the potential to adversely affect human health or groundwater quality;
(C) the source of fluids used to dilute, carry, or otherwise distribute the injectant throughout the injection zone as determined in accordance with Subparagraph (f)(3) of this Rule. If any well within the area of review of the injection facility is to be used as the fluid source, then the following information shall be submitted: location or ID number, depth of source, formation, rock or sediment type, and a chemical analysis of the water from the source well, including analyses for all contaminants suspected or historically recognized in soil or groundwater on the site;
(D) a description of the rationale for selecting the injectants and concentrations proposed for injection, including an explanation or calculations of how the proposed injectant volumes and concentrations were determined;
(E) a description of the reactions between the injectants and the contaminants present, including specific breakdown products or intermediate compounds that may be formed by the injection;
(F) a summary of results if modeling or testing was performed to investigate the injectant's potential or susceptibility for biological, chemical, or physical change in the subsurface; and
(G) an evaluation concerning the development of byproducts of the injection process, including increases in the concentrations of naturally occurring substances. Such an evaluation shall include the identification of the specific byproducts of the injection process, projected concentrations of byproducts, and areas of migration as determined through modeling or other predictive calculations.

(7) Injection Procedure. The applicant shall submit a description of the proposed injection procedure that includes the following:
(A) the proposed average and maximum daily rate and quantity of injectant;
(B) the average maximum injection pressure expressed in units of pounds per square inch (psi); and
(C) the total or estimated total volume to be injected.

(8) Engineering Planning Documents (For Systems Treating On-Site Contaminated Groundwater Only). If required by G.S. 89C, a professional engineer shall prepare these documents. The following documents shall be provided to the Division by the applicant:
[Note: The North Carolina Board of Examiners for Engineers and Surveyors has determined, via letter dated December 1, 2005, that preparation of engineering design documents pursuant to this Paragraph constitutes practicing engineering under G.S. 89C.]
(A) engineering plans for the entire system, including treatment, storage, application, and disposal facilities and equipment, except those previously permitted unless they are directly tied into the new units or are critical to the understanding of the complete process;

(B) specifications describing materials to be used, methods of construction, and means for ensuring quality and integrity of the entire groundwater remediation system;
(C) plans that include construction details of recovery, injection, and monitoring wells and infiltration galleries;
(D) operating plans that include:
(i) the operating schedule including any periodic shut-down times;
(ii) required maintenance activities for all structural and mechanical elements;
(iii) a list of all consumable and waste materials with their intended source and disposal locations;
(iv) restrictions on access to the site and equipment; and
(v) provisions to ensure the quality of the treated effluent and hydraulic control of the system at all times when any portion of the system ceases to function, such as standby power capability, complete system-off status, or duplicity of system components.

(9) Fracturing Plan. If hydraulic or pneumatic fracturing is proposed, then the applicant shall submit a detailed description of the fracturing plan that includes the following:
(A) Material Safety Data Sheets of fracturing media including information on any proppants used;
(B) a map of fracturing well locations indicating the known extent of groundwater contamination and all buildings, wells, septic systems, underground storage tanks, and underground utilities located within the area of review as described in Subparagraph (5) of this Paragraph;
(C) a demonstration that the fracturing process shall not result in the fracturing of any confining units or otherwise cause or contribute to the migration of contamination into uncontaminated areas, or otherwise cause damage to buildings, wells, septic systems, underground storage tanks, and underground utilities;
(D) the injection rate and volume;
(E) the orientation of bedding planes, joints, and fracture sets of the fracture zone;
(F) a performance monitoring plan for determining the fracture well radius of influence; and
(G) if conducted, the results of geophysical testing or a pilot demonstration of fracture behavior conducted in an uncontaminated area of the site.

(10) Injection well construction details including:
(A) the number and depth of injection wells;
(B) the number and depth of borings if using multi-level or "nested" well systems;
(C) information on whether the injection wells are existing or proposed;
(D) the depth and type of casing;
(E) the depth and type of screen material;
(F) the depth and type of grout;
(G) information on whether the injection wells are permanent or temporary "direct push" points; and
(H) the plans and specifications of the surface and subsurface construction details of each injection well or well system.

(11) Monitoring Wells. Monitoring wells shall be of sufficient quantity and location to detect any movement of injection fluids, injection process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (f)(3) of this Paragraph. The monitoring schedule shall be consistent with the proposed injection schedule, the pace of the anticipated reactions, and the rate of transport of the injectants and contaminants. The applicant shall submit a monitoring plan that includes the following:
(A) the target contaminants and the secondary or intermediate contaminants that may result from the injection;
(B) the other parameters that may serve to indicate the progress of the intended reactions;
(C) a list of existing and proposed monitoring wells to be used; and
(D) a sampling schedule for monitoring the proposed injection.

(12) Well Data Tabulation. A tabulation of data on all existing or abandoned wells within the area of review of the injection wells that penetrate the proposed injection zone, including monitoring wells and wells proposed for use as injection wells. Such data shall include a description of each

well's type, depth, record of abandonment or completion, and any additional information the Director may require to ensure compliance with G.S. 87-84.

(13) Maps and Cross-Sections. Scaled, site-specific site plans or maps depicting the location, orientation, and relationship of facility components including the following:

(A) an area map based on the most recent USGS 7.5' topographic map of the area, at a scale of 1:24,000 and showing the location of the proposed injection site;

(B) topographic contour intervals showing all facility related structures, property boundaries, streams, springs, lakes, ponds, and other surface drainage features;

(C) all existing or abandoned wells within the area of review of the injection wells listed in the tabulation required in Subparagraph (12) of this Paragraph that penetrate the proposed injection zone, including water supply wells, monitoring wells, and wells proposed for use as injection wells;

(D) potentiometric surface maps that show the direction of groundwater movement and existing and proposed wells;

(E) contaminant plume maps with isoconcentration lines that show the horizontal extent of the contaminant plume in soil and groundwater and existing and proposed wells;

(F) cross-sections to the known or projected depth of contamination that show the horizontal and vertical extent of the contaminant plume in soil and groundwater, major changes in lithology, and existing and proposed wells; and

(G) any existing sources of potential or known groundwater contamination, including waste storage, treatment, or disposal systems, within the area of review of the injection well or well system.

(14) Any other information necessary for the Department to ensure compliance with G.S. 87-84.

(g) Injection Volumes. The Director may establish maximum injection volumes and pressures necessary to ensure compliance with G.S. 87-84 and that:

(1) fractures are not initiated in the confining zone of the injection zone determined in accordance with Subparagraph (f)(3) of this Rule;

(2) injected fluids do not migrate outside the injection zone or area; and

(3) injected fluids and fractures do not cause or contribute to the migration of contamination into uncontaminated areas.

(h) Well Construction.

(1) Wells shall not be located where:

(A) surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscapes that will divert water to the well;

(B) a person would be required to enter confined spaces to perform sampling and inspection activities; and

(C) injectants or formation fluids would migrate outside the approved injection zone as determined by the applicant in accordance with Subparagraph (f)(3) of this Rule.

(2) Wells used for hydraulic or pneumatic fracturing shall be located within the boundary of known groundwater contamination but no closer than 75 feet to this boundary unless it can be demonstrated that a lesser separation distance will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L, such as through the use of directional fracturing.

(3) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well during its lifetime.

(4) The well shall be constructed in a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus either during or after construction.

(5) The borehole shall not penetrate to a depth greater than the depth at which injection will occur unless the purpose of the borehole is the investigation, of the geophysical and geochemical characteristics of an aquifer. Following completion of the investigation the borehole beneath the zone of injection shall be grouted completely to prevent the migration of any contaminants.

(6) For "direct-push" temporary injection wells constructed without permanent or temporary casing, injection and well abandonment activities shall be conducted within the same working day as when the borehole is constructed.

(7) Drilling fluids shall contain only potable water and may be comprised of one or more of the following:

(A) the formation material encountered during drilling; and
(B) materials manufactured specifically for the purpose of borehole conditioning or well construction.

(8) Only allowable grout listed under Rule .0107 of this Subchapter shall be used; however, bentonite grout shall not be used:
(A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction; or
(B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(9) The annular space between the borehole and casing shall be grouted:
(A) with a grout that is non-reactive with the casing or screen materials, the formation, or the injectant;
(B) from the top of the gravel pack to land surface and in a way that there is no interconnection of aquifers or zones having differences in water quality that would result in the degradation of the groundwater quality of any aquifer or zone; and
(C) so that the grout extends outward from the casing wall to a thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater. In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(10) Grout shall be emplaced around the casing by one of the following methods:
(A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface;
(B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the annular space that can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application; or
(C) Other. Grout may be emplaced in the annular space by gravity flow in a way to ensure complete filling of the space. Gravity flow shall not be used if water or any visible obstruction is present in the annular space at the time of grouting.

(11) All grout mixtures shall be prepared prior to emplacement per the manufacturer's directions with the exception that bentonite chips or pellets may be emplaced by gravity flow if water is present or otherwise hydrated in place.

(12) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.

(13) The well shall be grouted within seven days after the casing is set or before the drilling equipment leaves the site, whichever occurs first. If the well penetrates any water-bearing zone that contains contaminated or saline water, the well shall be grouted within one day after the casing is set.

(14) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(15) A casing shall be installed that extends from at least 12 inches above land surface to the top of the injection zone.

(16) Wells with casing extending less than 12 inches above land surface and wells without casing shall be approved by the Director only when one of the following conditions is met:
(A) site specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; or
(B) it is not operationally feasible for the well head to be completed 12 inches above land surface due to the engineering design requirements of the system.

(17) Multi-screened wells shall not connect aquifers or zones having differences in water quality that would result in a degradation of the groundwater quality of any aquifer or zone.

(18) Prior to removing the equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85, to preclude contaminants from entering the well.

(19) Packing materials for gravel and sand packed wells shall be:
(A) composed of quartz, granite, or other hard, non-reactive rock material;
(B) of uniform size, water-washed and free from clay, silt, and toxic materials;
(C) disinfected prior to subsurface emplacement;

(D) emplaced such that it will not connect aquifers or zones having differences in water quality that would result in the deterioration of the water quality in any aquifer or zone; and

(E) evenly distributed around the screen and shall extend to a depth at least one foot above the top of the screen. A one foot thick or greater seal comprised of bentonite clay, shall be emplaced directly above and in contact with the packing material.

(20) All permanent injection wells shall have a well identification plate that meets the criteria specified in Rule .0107 of this Subchapter.

(21) A hose bibb, sampling tap, or other collection equipment shall be installed on the line entering the injection well such that a sample of the injectant can be obtained prior to its entering the injection well.

(22) If applicable, all piping, wiring, and vents shall enter the well through the top of the casing unless it is based on a design demonstrated to preclude surficial contaminants from entering the well.

(23) The well head shall be completed in a manner to preclude surficial contaminants from entering the well, and well head protection shall include:

(A) an accessible external sanitary seal installed around the casing and grouting; and

(B) a water-tight cap or well seal compatible with the casing and installed so that it cannot be removed without the use of hand or power tools.

(i) Mechanical Integrity. All permanent injection wells shall be tested for mechanical integrity, which shall be conducted in accordance with Rule .0207 of this Section.

(j) Operation and Maintenance.

(1) Unless permitted by this Rule, pressure at the well head shall be limited to a maximum that will ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) Injection between the outermost casing and the well borehole is prohibited.

(3) The well owner shall monitor the operating processes at the well head and shall protect the well head against damage during construction and use.

(k) Monitoring.

(1) Monitoring of the injection well shall be required by the Director to protect groundwaters of the State.

(A) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(B) Analysis of the physical, chemical, biological, or radiological characteristics of the injectant shall be made monthly or more frequently, as approved by the Director, in order to provide representative data for characterization of the injectant.

(C) Monitoring of injection pressure, flow rate, and cumulative volume shall occur according to a schedule determined necessary by the Director.

(D) Monitoring wells associated with the injection site shall be monitored quarterly or on a schedule determined by the Director to detect any migration of injected fluids from the injection zone.

(2) In determining the type, density, frequency, and scope of monitoring, the Director shall consider the following:

(A) physical and chemical characteristics of the injection zone;

(B) physical and chemical characteristics of the injected fluids;

(C) volume and rate of discharge of the injected fluids;

(D) compatibility of the injected fluids with the formation fluids;

(E) the number, type, and location of all wells, mines, surface bodies of water, and structures within the area of review;

(F) proposed injection procedures;

(G) expected changes in pressure, formation fluid displacement, and direction of movement of injected fluid;

(H) proposals of corrective action to be taken in the event that a failure in any phase of injection operations renders the groundwaters unsuitable for their best intended usage as defined 15A NCAC 02L; and

(I) the life expectancy of the injection operations.

(3) Monitoring wells completed in the injection zone and any of those zones adjacent to the injection zone may be affected by the injection operations. If affected, the Director may require additional monitor wells located to detect any movement of injection fluids, injection process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (f)(3) of this Rule. If the operation is affected by subsidence or catastrophic collapse, any other required monitoring wells shall be located so that they will not be physically affected and shall be of an adequate number to detect movement of injected fluids, process byproducts, or formation fluids outside the injection zone or area. In determining the number, location and spacing of monitoring wells, the following criteria shall be considered by the Director:

(A) the population relying on the groundwater resource affected, or potentially affected, by the injection operation;

(B) the proximity of the injection operation to points of withdrawal of groundwater;

(C) the local geology and hydrology;

(D) the operating pressures;

(E) the chemical characteristics and volume of the injected fluid, formation water, and process byproducts; and

(F) the number of existing injection wells.

(l) Reporting.

(1) For all injection wells, the well owner shall be responsible for submitting to the Director on forms furnished by the Director the following:

(A) a record of the construction (form GW-1), abandonment (form GW-30), or repairs of the injection well within 30 days of completion of the specified activities; and

(B) the Injection Event Record within 30 days of completing each injection.

(2) For injection wells requiring an individual permit, the following shall apply:

(A) The well owner shall be responsible for submitting to the Director hydraulic or pneumatic fracturing performance monitoring results;

(B) All sampling results shall be reported to the Division annually or at another frequency determined by the Director based on the reaction rates, injection rates, likelihood of secondary impacts, and site-specific hydrogeologic information;

(C) A final project evaluation report shall be submitted within nine months after completing all injection-related activities associated with the permit or submit a project interim evaluation before submitting a renewal application for the permit. This document shall assess the injection projects findings in a written summary. The final project evaluation shall also contain monitoring well sampling data, contaminant plume maps, and potentiometric surface maps; and

(D) For groundwater remediation injection permits, each monitoring report shall include a summary identifying any detectable contaminant degradation breakdown products, and a table with historical laboratory analytical results. The table shall indicate any exceedances of groundwater standards per 15A NCAC 02L .0202, and shall distinguish data collected prior to injection from data collected after injection.

(m) Application and Annual Fees (For Systems Treating On-Site Contaminated Groundwater Only)

(1) Application Fee. For every application for a new or major modification of a permit under this Rule, a nonrefundable application processing fee in the amount provided in G.S. 143-215.3D shall be submitted to the Division by the applicant at the time of application. Modification fees shall be based on the annual fee for the facility.

(2) Annual Fees. An annual fee for administering and compliance monitoring shall be charged in each year of the term of every renewable permit per the schedule in G.S. 143-215.3D(a). Annual fees shall be paid for any facility operating on an expired permit that has not been rescinded or revoked by the Division. Permittees shall be billed annually by the Division. A change in the facility, which changes the annual fee, shall result in the revised annual fee being billed effective with the next anniversary date.

(3) Failure to pay an annual fee within 30 days after being billed may be cause for the Division to revoke the permit upon 60 days notice.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0226 SALINITY BARRIER WELLS

Salinity Barrier Wells, which inject uncontaminated water into an aquifer to prevent the intrusion of salt water into the fresh water, shall meet the requirements of Rule .0219 of this Section, except that the Director may impose additional requirements to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0227 STORMWATER DRAINAGE WELLS SYSTEMS

(a) Stormwater Drainage Wells Systems means well systems that receive the flow of water that occurs during rainfall or a snowmelt event.

(b) The following Stormwater Drainage Wells Systems shall be permitted by rule pursuant to Rule .0217 of this Section:

(1) systems designed in accordance with stormwater controls required by federal laws and regulations, State statutes and rules, or local controls; and
(2) infiltration systems, which receive stormwater from roof tops.

(c) Nothing in this Rule shall be construed as to allow untreated stormwater to be injected directly into any aquifer or to otherwise result in the violation of any groundwater quality standard as specified in 15A NCAC 02L.

(d) Reporting. Within 30 days of a change of status of the well drainage system, the owner or operator shall submit the following information to the Division:

(1) the facility name, address, and location indicated by either:
  (A) latitude and longitude with reference datum, position accuracy, and method of collection; or
  (B) a facility site map indicating property boundaries;
(2) the name, telephone number, and mailing address of owner or operator;
(3) the ownership of facility as a private individual or organization, or a federal, State, county, or other public entity;
(4) the number of injection wells drainage and collection systems; and
(5) the well injection system status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0228 SUBSIDENCE CONTROL WELLS

Subsidence Control Wells, which are used to inject uncontaminated fluids to reduce or eliminate subsidence associated with overdraft of fresh water or other activities not related to oil or natural gas production, shall meet the requirements of Rule .0219 of this Section, except that the Director may impose additional requirements to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0229 TRACER WELLS

Tracer Wells, which are used to inject substances for determining hydrogeologic properties of aquifers, shall meet the requirements of Rule .0225 of this Section, except that the Director may impose additional requirements to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0230 OTHER WELLS

Other Wells shall meet the requirements of that injection well type described in Rule .0209(5)(b) of this Section that most closely resembles the proposed Other Well's hydrogeologic complexity and potential to adversely affect groundwater quality. The Director may impose additional requirements to ensure compliance with G.S. 87-84.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0240 ABANDONMENT AND CHANGE-OF-STATUS OF INJECTION WELLS AND SYSTEMS

(a) Injection wells and injection well systems shall be abandoned by the well owner in accordance with one of the following procedures or other alternatives approved by the Director that ensures compliance with G.S. 87-84:

(1) Wells other than closed-loop geothermal wells shall be temporarily or permanently abandoned as required by Rule .0113 of this Subchapter.

(2) Closed-loop geothermal wells that are temporarily abandoned shall be maintained so that they are not a source or channel of contamination during the period of abandonment.

(3) Closed-loop geothermal wells shall be permanently abandoned as follows:

(A) all casing, tubing, or piping and associated materials shall be removed prior to abandonment if that removal will not cause or contribute to contamination of groundwater;

(B) the boring shall be filled from bottom to top with grout through a hose or pipe that extends to the bottom of the well and is raised as the well is filled;

(C) for tubing with an inner diameter of one-half inch or greater, the entire vertical length of the inner tubing shall be grouted;

(D) for tubing with an inner diameter less than one-half inch that cannot feasibly be grouted, the tubing shall be refilled with potable water and capped or sealed at a depth not less than two feet below land surface; and

(E) any protective or surface casing not grouted in accordance with the requirements set forth in this Section shall be removed and the well shall be grouted in accordance with the requirements set forth in this Section.

(4) If a subsurface cavity has been created as a result of the injection operations, the well shall be abandoned in a manner that will prevent the movement of fluids into or between aquifers and in accordance with the terms and conditions of the permit.

(b) An injection well that acts as a source or channel of contamination shall be brought into compliance with the standards and criteria of these Rules, repaired, or permanently abandoned. Repair or permanent abandonment shall be completed within 15 days of the discovery of the noncompliance.

(c) Exploratory or test wells, constructed for the purposes of obtaining information regarding an injection well site, shall be permanently abandoned in accordance with Rule .0113 of this Subchapter within two days after drilling or two days after testing is complete, whichever is later. However, if a test well is being converted to a permanent injection well, this conversion shall be completed within 30 days after drilling.

(d) An injection well shall be permanently abandoned by the drilling contractor before removing his or her equipment from the site if the well casing has not been installed or has been removed from the well bore.

(e) The well owner shall be responsible for permanent abandonment of a well except that:

(1) the well contractor shall be responsible for well abandonment if abandonment is required because the well contractor improperly locates, constructs, repairs or completes the well;
(2) the person who installs, repairs or removes the well pump shall be responsible for well abandonment if that abandonment is required because of improper well pump installation, repair or removal; or
(3) the well contractor (or individual) who conducts a test boring shall be responsible for its abandonment at the time the test boring is completed.

(f) Groundwater remediation systems that include infiltration galleries shall be abandoned as follows:
(1) 30 days prior to initiation of closure of a groundwater remediation system, the permittee shall submit the following documentation to the Division:
(A) the reasons for closure;
(B) a letter from the oversight agency authorizing closure of the system; and
(C) a description of the proposed closure procedure.
(2) The infiltration gallery shall be closed such that it:
(A) will be rendered permanently unusable for the disposal of fluids; and
(B) will not serve as a source or channel of contamination.
(3) Within 30 days following upon completion of the closure, the permittee shall submit the following documentation to the Division:
(A) a description of the completed closure procedure;
(B) the dates of all actions taken for the procedure; and
(C) a written certification a by North Carolina licensed engineer or geologist that the closure has been accomplished, and that the information submitted is complete, factual, and accurate.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0241 VARIANCE

(a) The Secretary, through the Director, may grant a variance from any construction or operation standards under the rules of this Section. Any request for a variance shall be made using the form set forth in Rule .0118(b) of the Subchapter by the person responsible for construction of the well for which the variance is sought pursuant to Rule .0118(b) of this Subchapter. The Director shall grant the variance if:
(1) the use of the well will not endanger human health and welfare or the groundwater; and
(2) construction or operation in accordance with the standards is not technically feasible or the proposed construction provides equal or better protection of the groundwater.

(b) The Secretary, through the Director, may require the variance applicant to submit such information necessary to make a decision to grant or deny the variance. The Director may impose such conditions on a variance or the use of a well for which a variance is granted and is necessary to ensure compliance with G.S. 87-84. The facts supporting any variance under this Rule shall be in writing and made part of the variance.

(c) The Secretary, through the Director, shall respond in writing to a request for a variance within 30 days after receipt of the variance request.

(d) For variances requested as a part of a permit application, the Director may include approval as a permit condition.

(e) A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition under G.S. 150B-23 within 60 days after receipt of the decision.

History Note: *Authority G.S. 87-87(4); 87-88; 143-215.1A; 143-215.3(a)(4);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

15A NCAC 02C .0242 DELEGATION

(a) The Secretary is delegated the authority to grant permission for well construction under G.S. 87-87.

(b) The Secretary is delegated the authority to give notices and sign orders for violations under G.S. 87-91.

(c) The Secretary may grant a variance from any construction standard, or the approval of alternate construction methods or materials, as specified under the rules of this Section.

History Note: *Authority G.S. 87-87(4); 143-215.1A; 143-215.3(a)(1); 143-215.3(a)(4);*
Eff. May 1, 2012;
Readopted Eff. September 1, 2019.

SECTION .0300 - PERMITTING AND INSPECTION OF PRIVATE DRINKING WATER WELLS

15A NCAC 02C .0301 SCOPE AND PURPOSE

(a) The purpose of the rules of this Section is to set out standards for permitting and inspection of private drinking water wells as defined in G.S 87-85 by local health departments pursuant to G.S. 87-97.

(b) The rules of 15A NCAC 02C .0100 apply to private drinking water wells, as well as the following:

(1) Potential sources of groundwater contamination shall not be located closer to the well than the separation distances specified in 15A NCAC 02C .0107(a)(2) or .0107(a)(3), as applicable;

(2) In addition to the provisions in 15A NCAC 02C .0109, the builder, well contractor, pump installer, or homeowner, as applicable, shall provide assistance when necessary to gain access for inspection of the well, pumps, and pumping equipment; and

(3) In addition to the requirements of 15A NCAC 02C .0113, any well that acts as a source or channel of contamination shall be repaired or permanently abandoned within 30 days of receipt of notice from the local health department.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0302 DEFINITIONS

The definitions in G.S. 87-85 and 15A NCAC 02C .0102 apply throughout this Section. In addition, the following definitions apply throughout this Section:

(1) "Abandonment Permit" means a well abandonment permit issued by the local health department authorizing or allowing the permanent abandonment of any private drinking water well as defined in the rules of this Section.

(2) "Certificate of Completion" means a certification by the local health department that a private drinking water well has been constructed or repaired in compliance with the construction permit or repair permit.

(3) "Construction of wells" means the term as defined in G.S. 87-85.

(4) "Construction permit" means a well construction permit issued by the local health department authorizing or allowing the construction of any private drinking water well as defined in the rules of this Section.

(5) "Known source of release of contamination" means a location where any of the following activities, facilities, or conditions have been documented by the Department of Environmental Quality or a local health department:

(a) Groundwater contamination incidents arising from agricultural operations, including application of agricultural chemicals pursuant to 15A NCAC 02L;

(b) Groundwater contamination associated with the construction or operation of injection, monitoring, and other wells subject to permitting under the Well Construction Act and this Subchapter;

(c) Groundwater contamination associated with the operation of non- discharge, discharge (NPDES) facilities, land application of animal waste, and other activities subject to permitting under G.S. 143-215.1;

(d) Releases of hazardous waste or constituents that currently exceed the Groundwater Quality Standards listed in 15A NCAC 02L at facilities governed under G.S. 130A-294;

(e) Dry-Cleaning Solvent Cleanup sites regulated under G.S. 143-215.104(A);

(f) Pre-regulatory landfills and Inactive hazardous substance or waste disposal sites governed under the Inactive Hazardous Sites Act of 1987, G.S. 130A-310;

(g) Solid waste facilities subject to 15A NCAC 13B that have monitoring wells with exceedances of the Groundwater Protection Standards as defined in 15A NCAC 13B .1634(g) and (h);

(h) Releases of petroleum and hazardous substances subject to G.S. 143-215.75 through 215.98;
(i) Sites that fall within the authority of the Brownfields Property Reuse Act as defined by G.S. 130A, Article 9 Part 5;
(j) Contamination associated with pollution sources in soils or other sites known or suspected to have exceeded the Groundwater Quality Standards listed in 15A NCAC 02L; or
(k) Contamination known to the local health department through experience with the property, surrounding properties, or information provided by the applicant.

(7) "Local Health Department" means the authorized agent of the county or district health department or its successor.
(8) "Person" means the term as defined in G.S. 87-85.
(9) "Plat" means a property survey prepared by a registered land surveyor, drawn to a scale of one inch equals no more than 60 feet, that includes: the specific location of all structures and proposed structures and appurtenances, including decks, porches, pools, driveways, out buildings, existing and proposed wastewater systems, existing and proposed wells, springs, water lines, surface waters or designated wetlands, easements, including utility easements, and existing or proposed chemical or petroleum storage tanks above or below ground. "Plat" also means, for subdivision lots approved by the local planning authority and recorded with the county register of deeds, a copy of the recorded subdivisions plat that is accompanied by a site plan that is drawn to scale.
(10) "Pumps" and "pumping equipment" means the terms as defined in G.S. 87-85.
(11) "Repair" means the term as defined in G.S. 87-85.
(12) "Repair permit" means a well repair permit issued by the local health department authorizing or allowing the repair of any private drinking water well as defined in the rules of this Section.
(13) "Site plan" means a drawing not necessarily drawn to scale that shows the existing and proposed property lines with dimensions, and the specific location of all structures and proposed structures and appurtenances, including decks, porches, pools, driveways, out buildings, existing and proposed wastewater systems, existing and proposed wells, springs, water lines, surface waters or designated wetlands, easements, including utility easements, and existing or proposed chemical or petroleum storage tanks above or below ground.
(14) "Water supply system" means pump and pipe used in connection with or pertaining to the operation of a private drinking water well including pumps, distribution service piping, pressure tanks, and fittings.
(15) "Well contractor activity" has the same meaning as in G.S. 87-98.2(6).
(16) "Well seal" means the term as defined in G.S. 87-85.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0303 APPLICATION FOR PERMIT

A property owner or the property owner's agent shall submit an application for a permit to construct, repair, or abandon a private drinking water well to the local health department for the county where the well is located or will be located. The application shall include:

(1) The name, the address, and the phone number of the proposed well property owner or agent;
(2) The signature of owner or agent;
(3) The address and the parcel identification number of the property where the proposed well is to be located;
(4) A plat or site plan;
(5) The intended use(s) of the property;
(6) Other information deemed necessary by the local health department to determine the location of the property and any site characteristics, such as existing or permitted sewage disposal systems, easements or rights of way, existing wells or springs, surface water or designated wetlands, chemical or petroleum storage tanks, landfills, waste storage, known source of release of contamination, and any other characteristics or activities on the property or adjacent properties that could impact groundwater quality or suitability of the site for well construction;

(7) Any current or pending restrictions regarding groundwater use as specified in G.S. 87-88(a); and
(8) Any variances regarding well construction or location issued under 15A NCAC 02C .0118.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0304 PERMITTING

(a) No person shall construct a private drinking water well without first obtaining a well construction permit from the local health department. No person shall repair a private drinking water well without first obtaining a well repair permit, except a well repair permit is not required for maintenance or pump repair or replacement. Disinfection in accordance with 15A NCAC 02C .0111 is a maintenance activity that does not require a repair permit. No person shall permanently abandon a private drinking water well without first obtaining a well abandonment permit from the local health department.

(b) Before issuing a well construction permit, the local health department shall conduct a field investigation to evaluate the topography, landscape position, available space, and potential sources of groundwater contamination on or around the site where a private drinking water well is to be located. Furthermore, the Department shall conduct a search of DEQ's published inventories to determine whether the proposed well site is located within 1,000 feet of a known source of release of contamination. The local health department shall issue a private water well construction permit after determining the site can be permitted for a well meeting the rules of this Section. The local health department shall not issue a construction permit for a well in violation of restrictions regarding groundwater use established pursuant to G.S. 87-88(a). The construction permit shall include a site plan showing the location of potential sources of contamination and area(s) suitable for well construction. The construction permit shall reference documentation from DEQ's published inventories of known releases of contamination within 1,000 feet of the proposed well site, and any known risk of constructing the well related to those findings. The local health department shall issue a written notice of denial of a construction permit if it determines a private drinking water well cannot be constructed in compliance with the rules of this Section. The notice of denial shall include reference to specific laws or rules that cannot be met and shall be provided to the applicant.

(c) Any well permit shall be valid for a period of five years; however, the local health department may revoke a permit at any time if it determines that there has been a material change in any fact or circumstance upon which the permit shall not be issued. The validity of a well construction permit or a well repair permit is not affected by a change in ownership of the site where a private drinking water well is proposed to be located if the proposed well can still be constructed or repaired in the permitted area and in accordance with this Section and 15A NCAC 02C .0100. The local health department may suspend or revoke any permits issued upon a determination that the rules of this Section have been violated.

(d) If there is an improperly abandoned well(s) on the site, the construction permit shall be conditioned upon repair or abandonment of those improperly abandoned well(s) in accordance with the rules of 15A NCAC 02C .0100.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0305 GROUT INSPECTION AND CERTIFICATION

(a) The well contractor shall contact the local health department to schedule a grout inspection before grouting a private drinking water well and include the location, permit number, and anticipated time for grouting each private drinking water well. The local health department shall schedule the appointment by the end of the business day before the grouting is to occur except where the local health department has made provisions for scheduling inspections at night or on the same day of the inspection.

(b) Upon completion of a grout inspection, the local health department shall provide a written certification on the well permit that a grout inspection was completed and that the grouting is in compliance with the rules of 15A NCAC 02C .0100. When a local health department is unable to conduct a grout inspection within one hour of the scheduled time, the well contractor may grout a well without a grout inspection by the local health department. The well contractor shall provide a written certification to the local health department that the well has been grouted in compliance with the rules of 15A NCAC 02C .0100. A completed Well Construction Record form GW-1 stating the well was grouted in compliance with the rules of this Section shall serve as the well contractor's grout certification.

For purposes of issuing a Certificate of Completion, the well contractor's grout certification shall be accepted by the local health department as evidence the grout complies with the rules of this Section if the local health department:

(1) was contacted by the well contractor to schedule a grout inspection;
(2) was unable to inspect the grouting of the well within one hour following the scheduled time; and
(3) upon final inspection, finds no evidence to indicate the well grout does not comply with the rules of this Section.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0306 WELL COMPLETION AND CERTIFICATION

(a) After receiving a permit to construct a private drinking water well, the property owner or agent shall notify the health department prior to well construction if any of the following occur:

(1) The separation criteria specified in 15A NCAC 02C .0107 cannot be met;
(2) The residence or other structure is located other than indicated on the permit;
(3) The use of the structure is changed from the use specified on the permit;
(4) The septic system needs to be changed from the location indicated on the permit;
(5) Landscaping changes have been made that may affect the integrity of the well;
(6) There are current or pending restrictions regarding groundwater use as specified in G.S. 87-88(a);
(7) The water source for any well intended for domestic use is adjacent to any water-bearing zone suspected or known to be contaminated; or
(8) Any other changes occur in the information provided in the application for the well permit.

(b) The well contractor shall maintain a copy of the well construction permit, repair permit, or abandonment permit on the job site at all times during the construction, repair, or abandonment of the well. The well contractor shall meet all the conditions of the permit.

(c) The well contractor shall submit a copy of Well Construction Record (GW-1) to the local health department. Upon completion of construction or repair of a private drinking water well for which a permit is required, the local health department shall inspect the well and issue a Certificate of Completion that includes an "as built" drawing. Prior to the issuance of a Certificate of Completion, the local health department shall verify that the well was constructed in the designated area and according to the well construction permit and the rules of this Subchapter. The local health department shall inspect the grout around the casing for any settling, inspect the well head after the well seal is in place, and verify that a Well Construction Record has been received from the certified well contractor. No person shall place a private drinking water well into service without first having obtained a Certificate of Completion.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0307 WELL DATA AND RECORDS

(a) Any person completing, abandoning, or repairing any well shall submit a record of the construction, abandonment, or repair to the local health department and the Division of Water Resources within 30 days of completion of construction, abandonment, or repair. The record shall be on a form provided by the Department of Environmental Quality.

(b) The local health department shall maintain a registry of all permitted private drinking water wells, specifying the well location and the water quality test results until the well is permanently abandoned in accordance with this Subchapter.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0308 APPEAL PROCEDURE

Appeals concerning permit decisions or actions by the local health department to enforce the rules of this Section shall be conducted according to the procedures established in G.S. 150B, the Administrative Procedure Act.

History Note: *Authority G.S. 87-87;*
Eff. July 1, 2008;
Readopted Eff. July 1, 2019.

15A NCAC 02C .0309 WELL ABANDONMENT AND CERTIFICATION

(a) The applicant or well contractor shall contact the local health department to provide notification of intent to permanently abandon a private drinking water well, and include the location, permit number, and anticipated time for abandonment of each private drinking water well. If it is conducting an inspection, the local health department shall schedule the appointment by the end of the business day before the abandonment is to occur except where the local health department has made provisions for scheduling inspections at night or on the same day as the inspection.

(b) Upon notification from the well contractor, the local health department may opt to inspect the well abandonment process. The local health department shall inform the well contractor of its availability and intention to inspect the well abandonment after notification pursuant to Paragraph (a) of this Rule. When a local health department is unable to conduct the abandonment inspection within one hour of the scheduled time, the well contractor may abandon the well without an inspection by the local health department.

(c) Upon completion of a permanent well abandonment, the local health department shall provide a written certification on the well abandonment permit, or other local health department form, that a well abandonment inspection was completed and that the abandonment is in compliance with the rules of 15A NCAC 02C .0100. When the local health department opts to not inspect the permanent abandonment process, the well contractor shall provide written certification to the local health department that the well has been abandoned in compliance with the rules of 15A NCAC 02C .0100. A completed Well Abandonment Record form GW-30 stating the well was abandoned in compliance with the rules of this Section shall serve as the well contractor's abandonment certification.

History Note: *Authority G.S. 87-87;*
Eff. July 1, 2019.

Appendix H
Site Investigations of Existing Wells to be Abandoned and Relocated

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2507 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

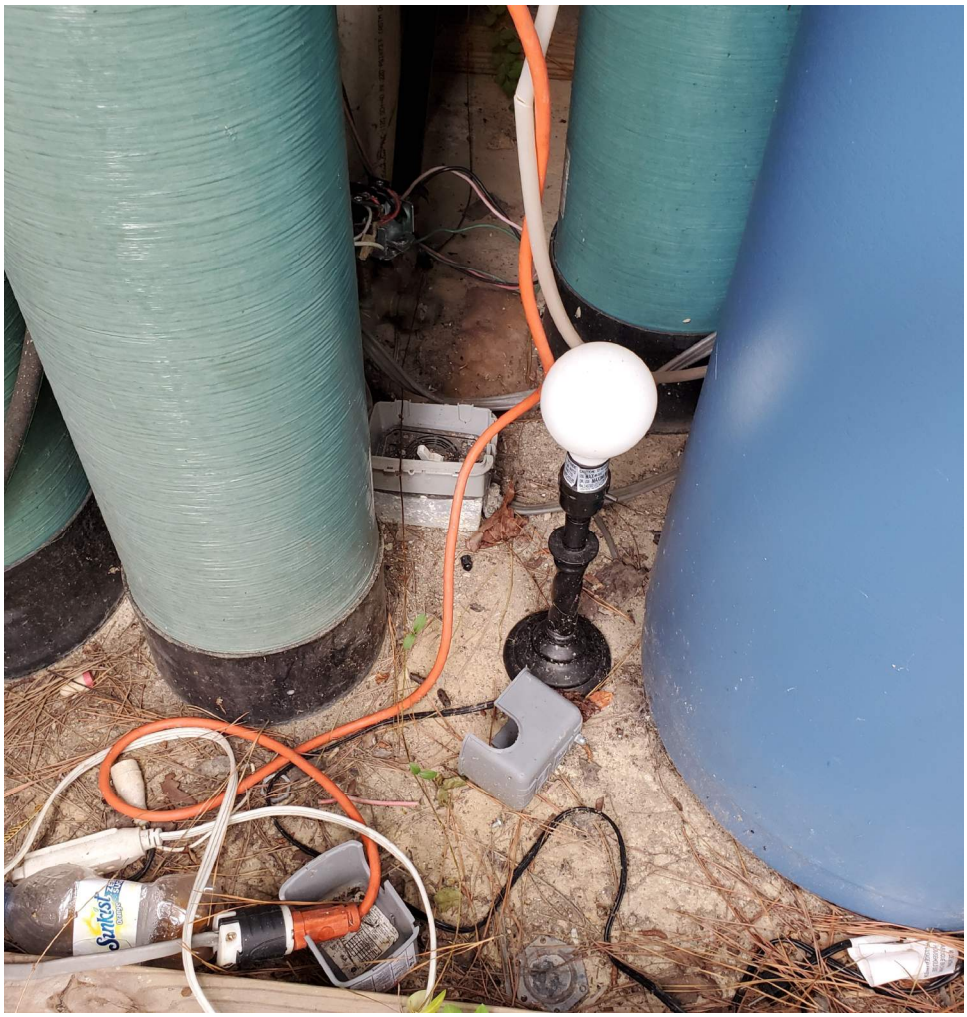
Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				Approx 30 feet deep
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan		Fabricated Built Structure	
Bladder Tank	Y	1	within Well House			
Water Filter	Y	1	within Well House			
Chemical Feed System	Y	1	within Well House	Pro-Elite Systems		Water Conditioning-Iron Removal - Purified Drinking Water - Taste, Color and Odor Control Removal
Pressure Gauge	Y	1	within Well House			
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Y	1	within Well House			
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					

Other:

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2507 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Side of house			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Heat Lamp	Y	1	within Well House			
Disconnect Switch	Unknown					
Other: Electrical Gate is connected to pump power circuit.						


FOR SERVICE CALL
(910) 229-2900
www.proeltesystems.com
THIS HOME PROTECTED BY...
BOTTLE FREE WATER SYSTEMS
FOR SERVICE CALL
(910) 229-2900
www.proeltesystems.com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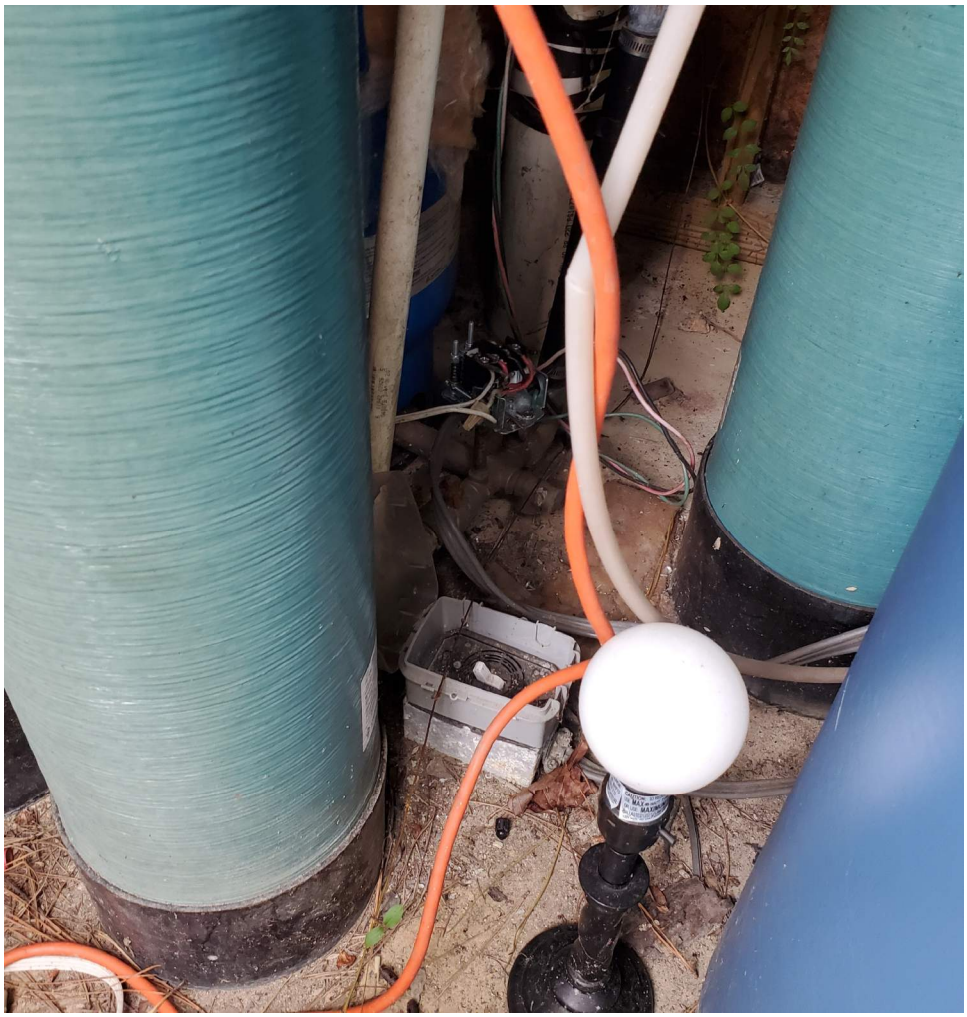
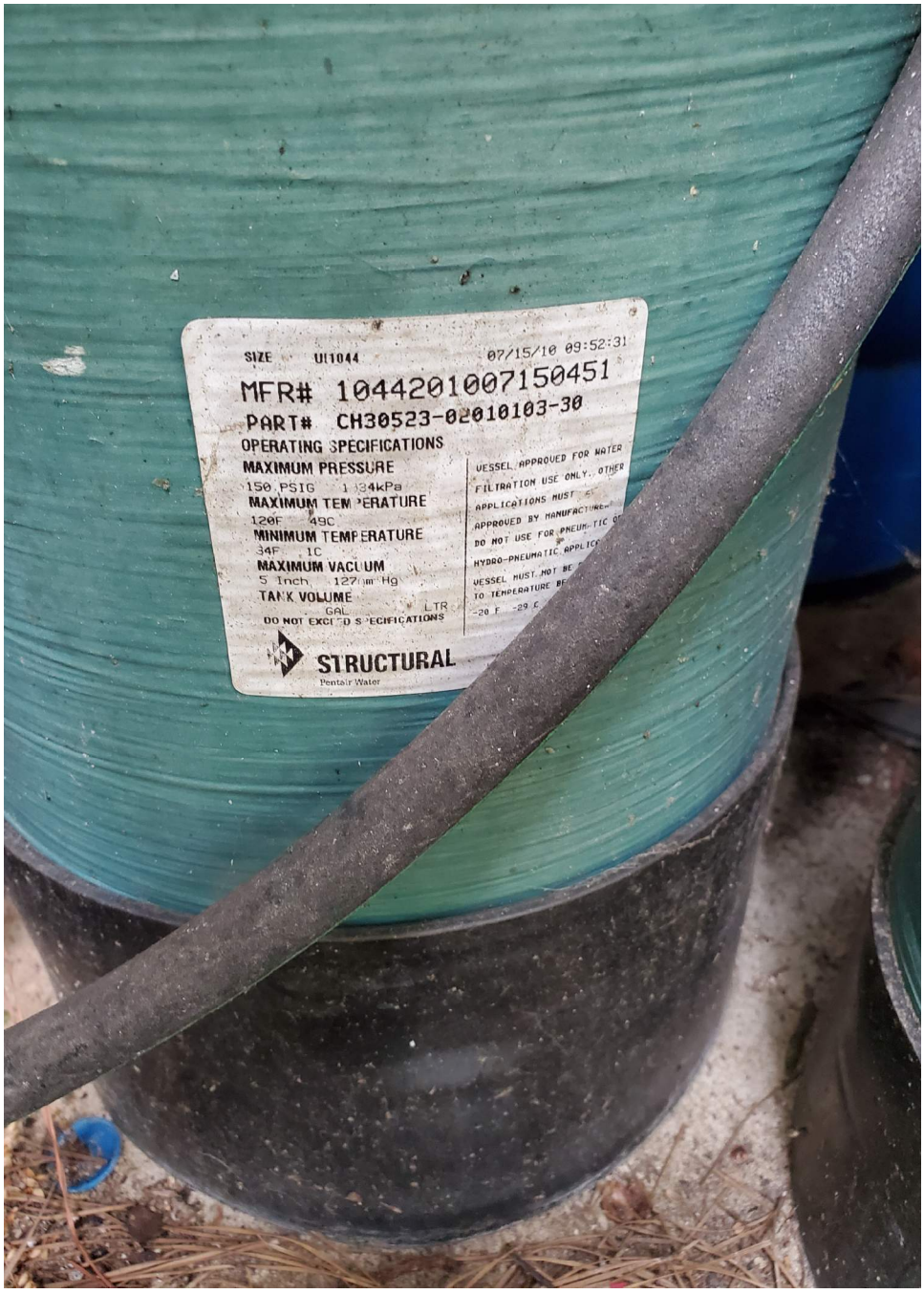



WATER CONDITIONING • IRON REMOVAL
PURIFIED DRINKING WATER • TASTE, COLOR AND ODOR REMOVAL
THIS HOME PROTECTED BY...
BOTTLE FREE WATER SYSTEMS
FOR SERVICE CALL
(910) 229-2900
www.proelitesystems.com
Dealer
Pro-Elite
1565NC
Dealer
Pro-Elite


SIZE UI1044
07/15/10 09:52:31
MFR# 1044201007150451
PART# CH30523-02010103-30
OPERATING SPECIFICATIONS
MAXIMUM PRESSURE
150 PSIG 1034kPa
MAXIMUM TEMPERATURE
120F 49C
MINIMUM TEMPERATURE
34F 1C
MAXIMUM VACUUM
5 Inch 127mm Hg
TANK VOLUME
GAL LTR
DO NOT EXCEED SPECIFICATIONS
VESSEL APPROVED FOR WATER
FILTRATION USE ONLY. OTHER
APPLICATIONS MUST
APPROVED BY MANUFACTURE
DO NOT USE FOR PNEUMATIC
HYDRO-PNEUMATIC APPLIC
VESSEL MUST NOT BE
TO TEMPERATURE BE
-20 F -29 C
STRUCTURAL
Pentair Water


FOCUS AXR-SD
LUMBEE RIVER EMC
043450


Type FOCUS AXR-SD
FORM 2S CL200 240V 3W 60Hz TA=30 Kh 7.2
LUMBEE RIVER EMC
D43450
157 108 571
Landis+Gyr
SEAL

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2545 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

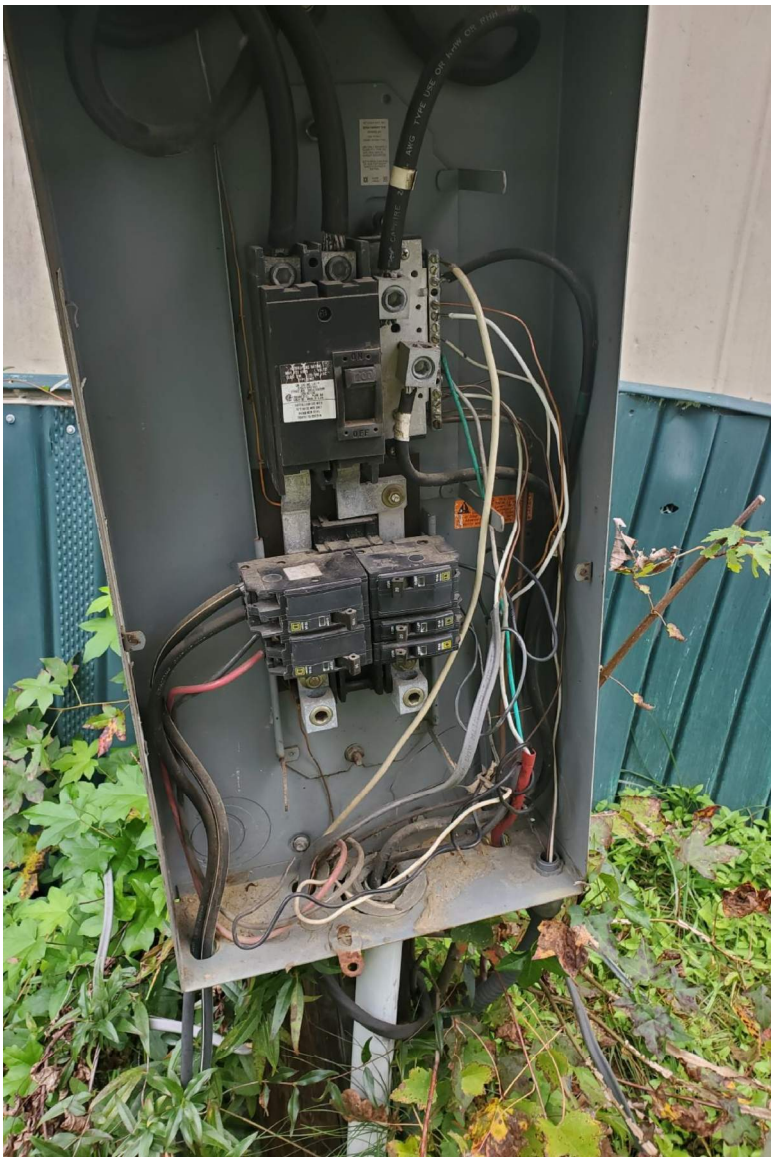
Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				
Well Pumps	Y	1	within Well House	Pentair (STA-RITE)	1/2 HP 115/230V 3450RPM	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	Y	1			Prefab/ Fiberglass	
Bladder Tank	Y	1	within Well House			
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 psi	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Y	1	within Well House			
Hose Bibs	Unknown					
Drain Valve	Y	1	within Well House			
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other: Old line from well to house.						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Outsdie of House			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					
Other:						


PENTAIR


PENTAIR
STA-RITE
1016077
STA-RITE
ProJet
Motor# C48H2EC11C3
PENTEK
HP 1/2
kW
115/230 V
3450RPM
PH 60 Hz
KVA J
MaxLoad Amps 9 9/4 95
S.F. 1.30
THERMALLY PROTECTED
TYPE T
Insulation Class B
Ambient Temp 50 °C
Time Rating CONT
MFG# 59587485
GRD GREEN (GROUND)
*Manufacturer Approved for Indoor and Outdoor Use
*Approuvé par le fabricant pour usage à l'intérieur ou à l'extérieur
*Aprobado por el fabricante para uso en interiores y exteriores


Electrical Hazard.
Can cause severe injury or death.
Connect ground wire to green grounding screw before operating motor.
Replace all covers before operation.
Disconnect power before servicing.
Power source must agree with nameplate.
To reduce risk of electric shock, see owner's manual for proper installation.
If dual voltage motor-internal adjustments may have to be made when this pump is installed or moved.
Use copper conductors only.
Non-Submersible water pump.
See owner's manual for proper installation and operation instructions.
Risque de secousses électriques.
Pour minimiser les risques d'électrocution, se reporter à la Notice d'utilisation pour une bonne installation.
Pompe à eau non submersible.
Se reporter à la Notice d'utilisation pour connaître les instructions d'installation et de fonctionnement.
Peligro eléctrico.
Bomba de agua no sumergible.
Consulte el manual del propietario para obtener las instrucciones correctas sobre la instalación y el funcionamiento.



Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2551 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				
Well Pumps	Y	1	within Well House	Flotec	1/2 HP 3450 RPM	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	Y	1	within Well House		Prefab/ Doghouse Fiberglass	
Bladder Tank	Y	1	within Well House	Water Worker		
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Unknown					
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Unknown					
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Y	1	within Well House			
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Y	1	within Well House			
Safety Rope	Unknown					
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Outside of House			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					
Other:						


MASTER PLUMBER
Motor
C48H2EC11C3A5
E46412
Century
HP 1/2
KW
115/230 V
3450RPM
1PH
60 Hz
KVA J
MaxLoad Amps 9 9/4.95
S.F. 1.30
THERMALLY PROTECTED
TYPE T
Insulation Class
Ambient Temp
Time Rating
B
50
1.0
CONT.
MFGR. 8325395
GRD GREEN (GROUND)
HIGH VOLTAGE SHOWN. ROTATE DIAL
CCW TO 115 FOR LOW VOLTAGE.
USE COPPER CONDUCTORS ONLY.
INSTALL MOTOR WITH VENTS DOWN.
ACCEPTABLE FOR FIELD WIRING
NEUTRAL LINE
WARNING
Cancer and Reproductive Harm
ADVERTENCIA: Cáncer y daños al sistema reproductor
AVERTISSEMENT: peut causer des cancers et des dangers pour la reproduction
www.P65Warnings.ca.gov
1021006


QO LOAD CENTER
CAT. NO. QO30M200RB
DANGER: Hazard of Electrical Shock or Burn. TURN OFF POWER Supplying This Equipment Before Working Inside. Replace Trim Before Turning Power ON.
WARNING: This Equipment is Designed and Tested by Square D to Performance Levels Which Exceed Those of Other Than Square D Devices May Adversely Affect Their Safety, Reliability and Void the Warranty.
SQUARE D COMPANY
MAIN
A/C

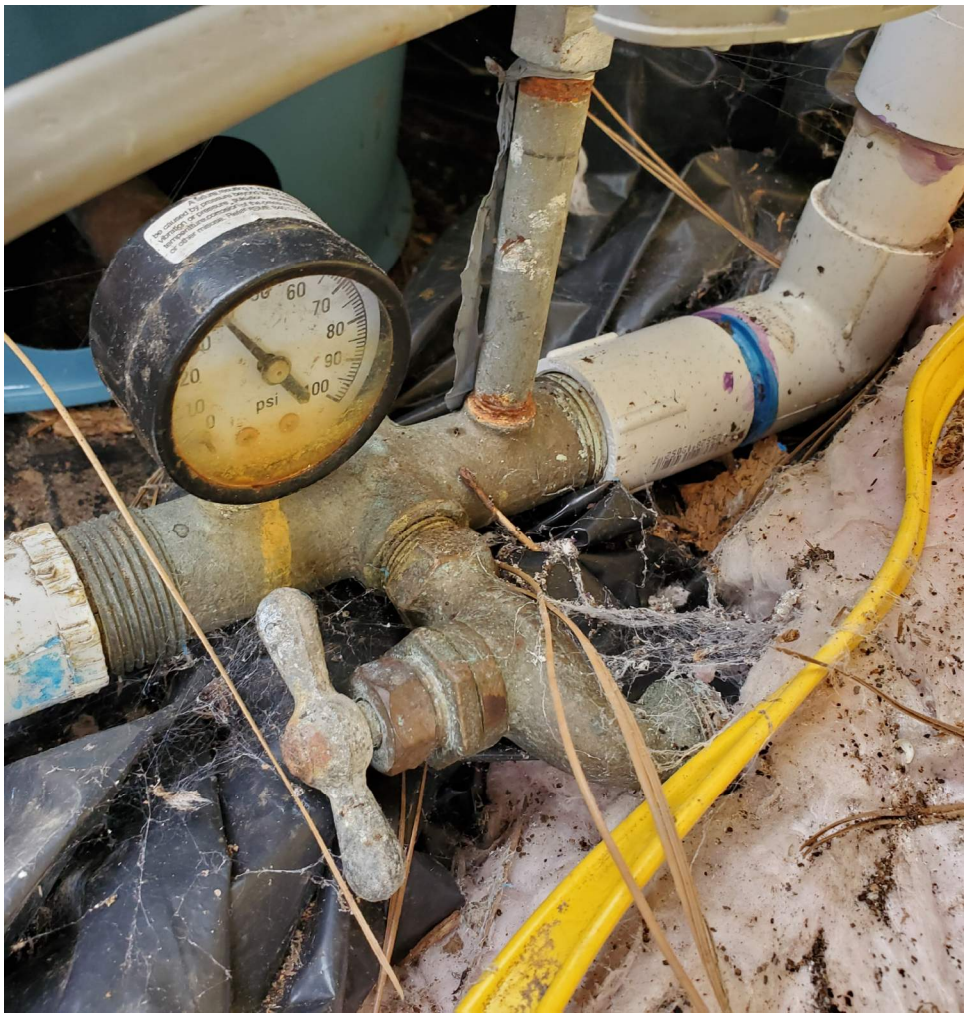
Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2561 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1	See Plan			Approx 25 to 30 feet deep
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan		Prefab/ Fiberglass	
Bladder Tank	Y	1	within Well House		125 PSI	
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 psi	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Y	1	within Well House			
Hose Bibs	Y	1	within Well House			
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Y	1	within Well House			
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other: House was burned down and not on parcel. Well is active but not being used.						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Unknown					
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					
Other: Appears no power to well, since no structure is tied to it.						


R-13


WATER PRO
Precharged Water System Tank
NSF


60
70
80
90
psi

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2564 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				Approx 15 to 25 feet depth
Well Pumps	Y	1	within Well House	Pentair (STA-RITE)	1 HP 115/230V 3450RPM	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	Y	1			Prefab/ Fiberglass	
Bladder Tank	Y	1	within Well House	Well X-Trol		
Water Filter	Y	1	within Well House			
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 psi	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Y	1	within Well House			
Hose Bibs	Y	1	within Well House			
Drain Valve	Y	1	within Well House			
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Y	1				
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Within house			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Y	1				
Other:						


WELL-TROL
Professional


PENTAIR
WARNING
STA-RITE®
Motor# C48K2EC11C3
PENTEK
HP 1
kW
3450RPM
1PH 60 Hz
115/230 V
MaxLoad
14.8/7.4
KVA K
THERMALLY PROTECTED
S.F. 1.25
TYPE B
Insulation Class
B
Ambient Temp.
50 °C
Time Rating
CONT.
Pump Model No.
SNE-L
Code/Codigo
001H17C
0116
UL778
CSA108
LR47013
C US
CSA ENC 2
INDOOR USE
Assembled in USA
MFG#
6371178
*Motor prewired 230 Volt
*Le moteur estcable pour le courant 230 Volts
*El motor esta precableado para 230 Voltios
GRD GREEN (GROUND)
NEUTRAL
LINE
*For supply connection use wires acceptable for at least 90° C
*Pour les connexions ducourant d'alimentation, utiliser des fils pouvant supporter une temperature au moins 90° C
*Para las conexiones del suministro de energia, usar cables aptos para por lo menos 90° C
*Manufacturer Approved for Indoor and Outdoor Use
U33-210
*Approuvé par le fabricant pour usage à l'intérieur ou à l'extérieur
*Aprobado por el fabricante para uso en interiores y exteriores


DATE CODE:
2221466
MODEL NUMBER:
WX-202
DATE OF MANUFACTURE:
05/26/2006
MAXIMUM WORKING PRESSURE:
125 PSI
TEST PRESSURE
125 PSI


American
WATER
FILTER
WC54-PK


MAIN

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2571 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				
Well Pumps	Y	1	within Well House	Flotec	3/4 HP 3450 RPM	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	Y	1	within Well House		Prefab/ Fiberglass	
Bladder Tank	Y	1	within Well House			
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Y	1	within Well House			
Hose Bibs	Y	1	within Well House			
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y		Outside of House			
Pressure Switch	Y		within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					
Other:						


Flotec

Motor Model
HP 3/4
RPM 3450
Max Load Amps
THERMALLY PROTECTED
A.O. Smith Corp.
Fluid Model No.
FP4JZ-10L
DELAVAN, WISCONSIN 53115
Motor power cable
Motor power 230 Volts
Electrical hazard
Can cause severe injury
or death.


HYDRO-PNEUMATIC PUMP TANK
WARNING!
MODEL NUMBER
SERIAL NUMBER
MAX. WORKING PRESS. PSIG
LPT365
1719C002275
100
MFD. FOR UTILITECH CHARLOTTE, NC
WARNING / AVERTISSEMENT / AEVERTENCIA
Explosion Hazard
Risque d'explosion
Peligro de explosión


Air Handler
Heat Pump

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2583 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				Approx 90 to 100 feet deep
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan		Prefab/ Fiberglass	
Bladder Tank	Y	1	within Well House	Water Pro		
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Y	1	within Well House			
Hose Bibs	Y	1	within Well House			
Drain Valve	Y	1	within Well House			
Release Valve	Unknown					
Ball Valve	Y	2	within Well House			
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other: Sprinkler System within yard and will need to be considered to be replaced when new well is installed.						
Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Control Panel	Y	1	Within House			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Heat Lamp	Y	1	within Well House			
Disconnect Switch	Unknown					
Other:						


WATER PRO


DOT-SP-11592
WARNING
ELECTROCUTION AND EXPLOSION HAZARD: Before work is performed on the tank, turn off power to the pump and release all water pressure in the tank and pumping system. Failure to follow the instructions in accompanying product manual can cause a rupture or explosion; possibly causing serious or fatal injury, leaking or flooding and/or property damage.
• Install a pressure relief valve as described in the manual between the pump and tank.
• Use only potable water. Do not operate in a setting where the ambient temperature can exceed 60°C (140°F) or below 0°C (32°F).
• Max. Working Temperature 93°C (200°F).
BURN HAZARD: Max. Working Pressure specified for this product.
EXPLOSION HAZARD: Like most pressurized tanks, this tank can over time corrode, weaken, and rupture.
• Do not attempt to repair or re-pressurize this product except for any adjustment at the time of the initial installation when the product is new, and as described in the manual.
• Do not encase in the ground where it may be hidden from view and as described in the manual.
Avoid risk of personal injury or property damage: If the tank appears to be malfunctioning or corroded, call a qualified professional. Current copies of the product manual can be viewed at www.amtrol.com
CAUTION
DOT TEST PRESSURE 114 PSI
AMTROL
West Warwick, RI 02893 USA
Warranty void when serial label is removed.
SERIAL NUMBER:
422-08211-05616
MODEL - PART NUMBER:
WP20
DATE OF MANUFACTURE:
03/23/2011
MAX WORKING PRESSURE / MAX RELIEF PRESSURE
100 PSI 75 PSI
INSTALLER'S COPY
422-08211-05616
DUMPRO

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2603 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan	Prefab/ Fiberglass		
Bladder Tank	Y	1	within Well House	AO Smith	125 PSI	
Water Filter	Y		within Well House			
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	Y					Not being used
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Y	1				
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Y	1				
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Box	Y	1	Outside house inaccessible - locked			
Pressure Switch	Y	1				
Safety Switch	Unknown					
Pump Savor	Unknown					
Heat Lamp	Y	1	within Well House			
Disconnect Switch	Unknown					
Other:						


0
10
20
30
40
50
60
70
80
90
100
psi


DANGER / PELIGRO / DANGER
HAZARDOUS VOLTAGE
• Disconnect power before removing cover.
EXCESSIVE PRESSURE
• Max. rating 220 psi (1517 kPa).
• Check operation after adjustment. Check supply line for blockage.
TENSION PELIGROSA
• Desenergice antes de retirar el frente.
PRESIÓN EXCESIVA
• Cap. máx.: 1517 kPa (220 psi).
• Verifique el funcionamiento después del ajuste.
• Asegúrese de que no esté bloqueada la línea de alimentación.
TENSION DANGEREUSE
• Coupez l'alimentation avant de retirer le couvercle.
PRESSION EXCESSIVE
• Valeur nom. max. : 1517 kPa (220 lb/po²).
• Vérifiez le fonctionnement après le réglage.
• Vérifiez qu'il n'y a pas de blocage dans la ligne d'alimentation.


A.O.Smith

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2623 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y	1				
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan	Prefab/ Fiberglass		
Bladder Tank	Y	1	within Well House		125 PSI	
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Unknown					
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Outside of house			
Pressure Switch	Y	1	within Well House			
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					
Other:						

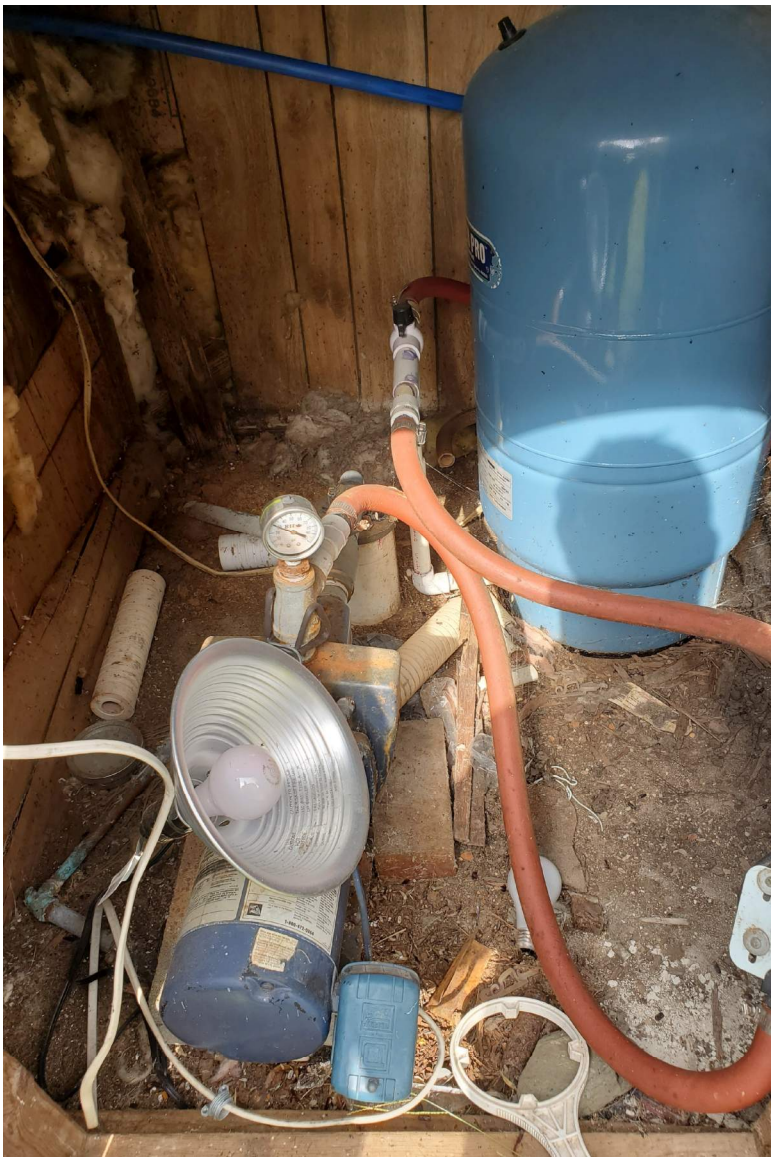

Service
425-0189


FOCUS kWh
LUMBEE RIVER EMC
T51066

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2653 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

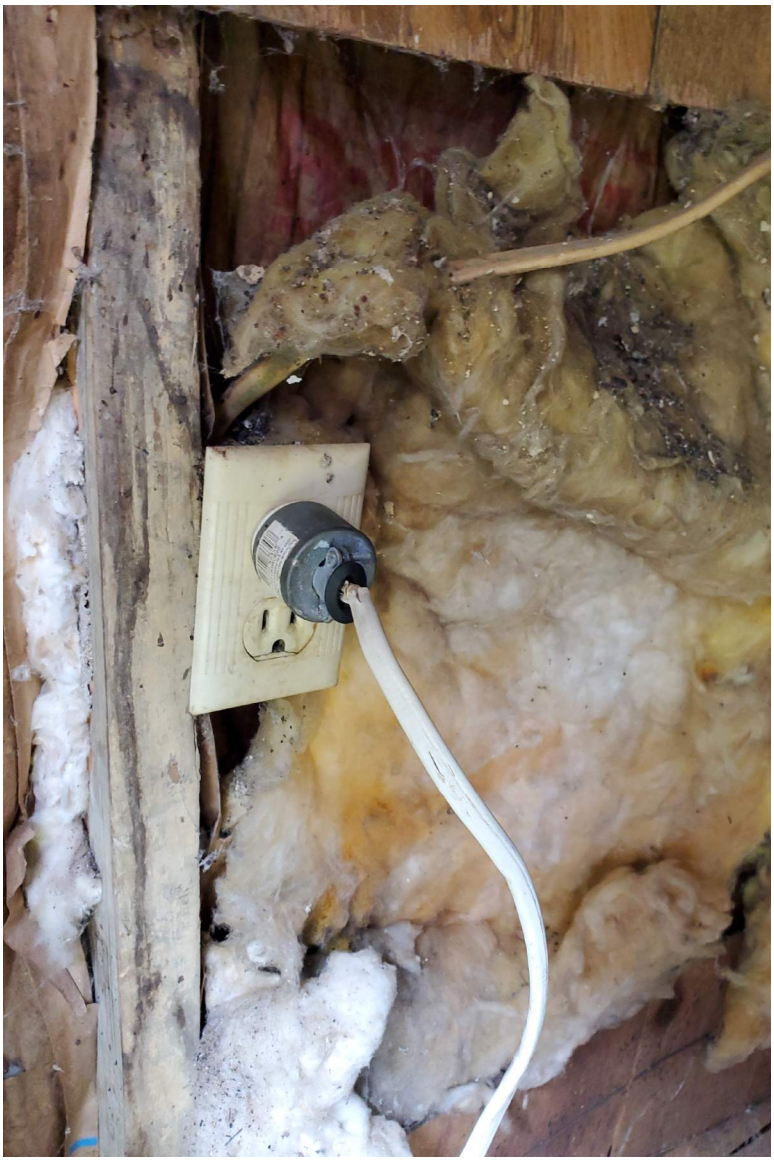
Water Supply System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y					
Well Pumps	Y	1	within Well House	STA-Rite	3/4 HP 115/230 V 60HZ	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1		Fabricated Built Structure		
Bladder Tank	Y	1	within Well House			
Water Filter	Y	1	within Well House			
Chemical Feed System						
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	unknown					
Check Valves	unknown					
Sample Taps	unknown					
Hose Bibs	Y	1	outside of well house			
Drain Valve	unknown					
Release Valve	unknown					
Ball Valve	unknown					
Fasteners	unknown					
Gaskets	unknown					
Pipe Supports	unknown					
Pitless Adaptor	unknown					
Torque Arrestor	unknown					
Clamps	unknown					
Safety Rope	unknown					
Other:						

Electrical System						
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	unknown					
Motor Drives	unknown					
Sensors	unknown					
Breaker Panel	Y	1				In garage
Pressure Switch	Y	1				
Safety Switch	unknown					
Pump Savor	unknown					
Lightening Arrestor	unknown					
Disconnect Switch	unknown					
Other:						

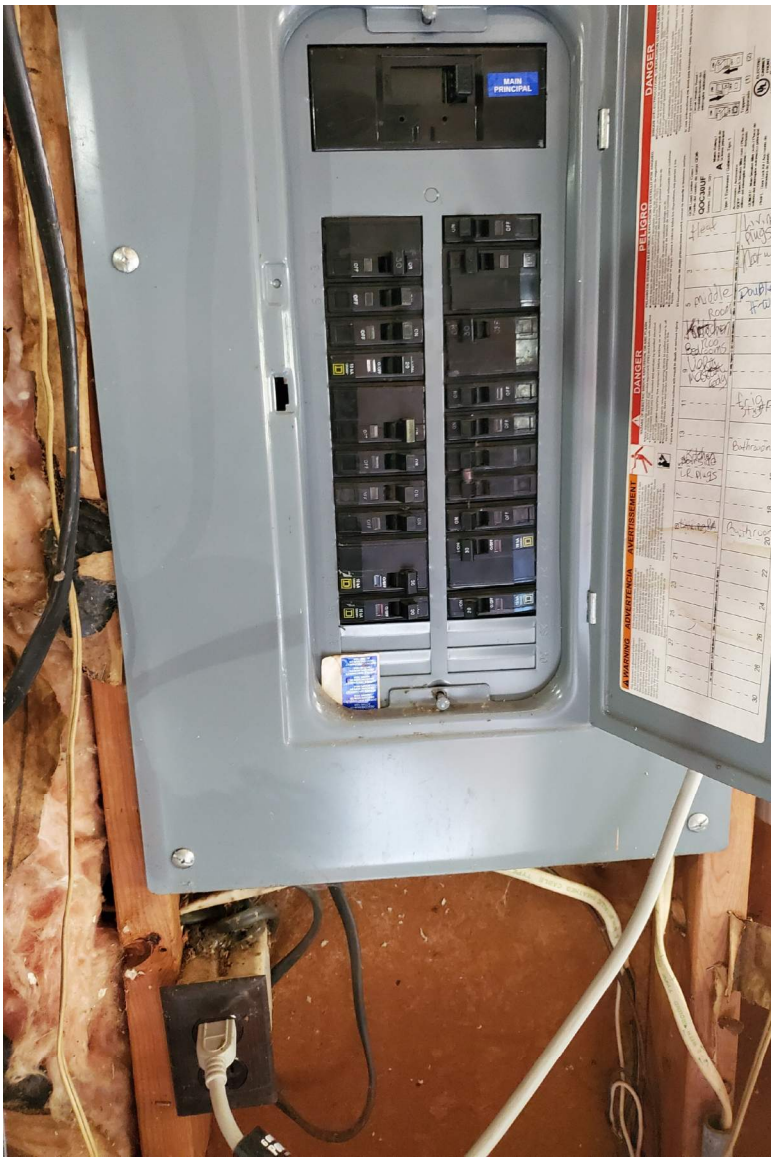



STA-RITE
PRINTED IN U.S.A.
Motor# C48J2EG11C3
HP 3/4 kW 115/230V
3450RPM 1PH 60Hz KVA J
MaxLoad Amps 12.4/6.2 S.F. 1.27
THERMALLY PR TYPE B
Insulation Class 6 Ambient Temp 50 Time Rating CONT.
A.O.Smith Corp.
GRD GREEN (GROUND)
HIGH VOLTAGE SHOWN. ROTATE DIAL CCW TO 115 FOR LOW VOLTAGE.
USE COPPER CONDUCTORS ONLY.
INSTALL MOTOR WITH VENTS DOWN.
NEUTRAL LINE
827103-005
FOR INDOOR USE ONLY.


PRO
BII
psi




SCH 40


MAIN
PRINCIPAL
DANGER
PELIGRO
DANGER
AVERTISSEMENT
ADVERTENCIA
WARNING

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2659 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System

Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Water Supply Well	Y					
Well Pumps	Y	1			Submersible	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	Y	1		Prefab/ Fiberglass		
Bladder Tank	Unknown					
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Unknown					
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Unknown					
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					

Other: Inaccessible - bolted down and could not access pump enclosure.

Electrical System

Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameters	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	Outside of house			
Pressure Switch	Unknown					
Safety Switch	Unknown					
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Unknown					

Other:


MAIN
PRINCIPAL
DANGER
PELIGRO
WARNING
ADVERTENCIA
Downstairs
Attic
GFI

200
ON
OFF
20
20
20
100
100
20
20
Common Trip

Pool Pump
Boathouse Sub Panel
WATER PUMP
Pool Light
Common Trip
100
20
20

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2667 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System

Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/ Parameters	Comments/Notes
Water Supply Well	Y					Appears to be decommisioned
Well Pumps	Y	1		A.O. Smith Corp	1/2 HP 3450 RPM 60HZ	
Well Cap	Unknown					
Well Seal	Unknown					
Well Housing/Enclosure	N					
Bladder Tank	Y	1				
Water Filter	Unknown					
Chemical Feed System	Unknown					
Pressure Gauge	Y	1				
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Y	1				
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					

Other: Well appears to be decommissioned. The house is under renovation and needs new well. Contractor to coordinate with property owner and PWC Project Coordinator with location and power will be supplied to pump.

Electrical System

Components	Present (Y/N)	Quantity	Location	Manufacturer	ize/Parameter	Comments/Notes
Pump Controller						
Motor Drives						
Sensors						
Control Panel						
Pressure Switch						
Safety Switch						
Pump Savor						
Lightening Arrestor						
Disconnect Switch						

Other: No Power


WELL-X-TROL


BLACK TRACER
BLACK
BLACK TRACER
BLACK
NPS 1162
E46412
THERMALLY PROTECTED
SKMET57RHN
SER 1F80
MOTOR MOD C48H2EC11
HP 1/2
VOLTS 115/230
KW .37
PH 1
CODE M
RPM 3450
FR 48Y
Hz 60
SF 1.3
MAX LOAD AMPS 8.8/4.4
Cont
INSUL CLASS B
AMB 40 °C
TYPE UC
A.O.SMITH CORP.
MADE IN USA

Project: Big Rockfish Creek Outfall Well Relocation | Site Visit Checklist | Address: 2673 Lakeview Drive | Date: 10/26/22 | Personnel: M. Perro; M. Huckaby

Water Supply System

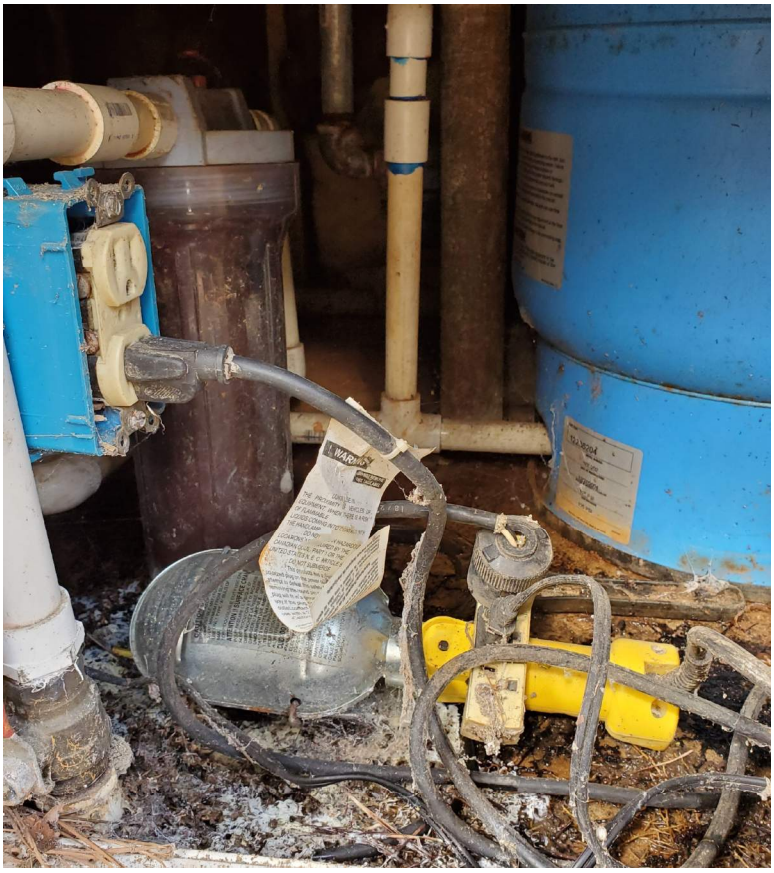
Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/ Parameters	Comments/Notes
Water Supply Well	Y	1	See Plan			Approx 25 to 30 feet deep
Well Pumps	Y	1	within Well House		Submersible	
Well Cap	Y	1	within Well House			
Well Seal	Y	1	within Well House			
Well Housing/Enclosure	Y	1	See Plan	Fabricated Built Structure		
Bladder Tank	Y	1	within Well House		125 PSI	
Water Filter	Y	1	within Well House			
Chemical Feed System	Y	1	within Well House			
Pressure Gauge	Y	1	within Well House		100 PSI	
Cable Guard	Unknown					
Check Valves	Unknown					
Sample Taps	Unknown					
Hose Bibs	Y		within Well House			
Drain Valve	Unknown					
Release Valve	Unknown					
Ball Valve	Unknown					
Fasteners	Unknown					
Gaskets	Unknown					
Pipe Supports	Unknown					
Pitless Adaptor	Unknown					
Torque Arrestor	Unknown					
Clamps	Unknown					
Safety Rope	Unknown					

Other:

Electrical System

Components	Present (Y/N)	Quantity	Location	Manufacturer	Size/Parameter	Comments/Notes
Pump Controller	Unknown					
Motor Drives	Unknown					
Sensors	Unknown					
Breaker Panel	Y	1	within House			
Pressure Switch	Y	1	within Well House			
Heat Lamp	Y	1	within Well House			
Pump Savor	Unknown					
Lightening Arrestor	Unknown					
Disconnect Switch	Y					

Other:


WARNING


122.8204


GASOLIN


GASOLINE