



Invitation for Bid No. 2021-078
West Fork Twelve-Mile Creek Interceptor

Due Date: May 27, 2021

Time: 11:00 AM Local Time

Receipt Location: Union County Government Center
Procurement Department
500 N. Main Street, Suite 709
Monroe, NC, 28112

Procurement Representative:

Vicky Watts, CLGPO
Senior Procurement Specialist
(704) 283-3601
vicky.watts@unioncountync.gov

Prepared by:

Hazen and Sawyer
9101 Southern Pine Blvd. Suite 250
Charlotte, NC 28273
(704) 357-3150
NC License No. C-0381



Invitation for Bid No. 2021-078
West Fork Twelve-Mile Creek Interceptor
Union County Project No. SW037
Bid Set

April 2021



Hazen

**UNION COUNTY
UNION COUNTY, NORTH CAROLINA
WEST FORK TWELVE-MILE CREEK INTERCEPTOR
UCPW PROJECT NO. SW037**

PROJECT MANUAL

SECTION 00003

TABLE OF CONTENTS

<u>Division</u>	<u>Section</u>	<u>Title</u>
		<u>BIDDING AND CONTRACT REQUIREMENTS</u>
	C-111	Advertisement Notice for Bids
	C-200	Instructions to Bidders
	C-410	Bid Form
	C-430	Bid Bond
	C-510	Notice of Award
	C-520	Agreement
	C-550	Notice to Proceed
	C-610	Performance Bond
	C-615	Payment Bond
	C-620	Contractor's Application for Payment
	C-625	Certificate of Substantial Completion
	C-700	Standard General Conditions
	C-800	Supplementary Conditions
	C-940	Work Change Directive
	C-941	Change Order
	C-942	Field Order
	C-950	E-Verify Affidavit
1		<u>GENERAL REQUIREMENTS</u>
	01005	General Requirements
	01010	Summary of Work
	01011	Surveys and Layout
	01012	Special Provisions
	01015	Permits and Agreements
	01025	Payment Item Descriptions
	01040	Coordination
	01110	Environmental Protection Procedures
	01152	Applications for Payment
	01153	Change Order Procedures
	01200	Project Meetings
	01300	Submittals
	01320	Project Photographs

<u>Division</u>	<u>Section</u>	<u>Title</u>
	01330	Project Schedule
	01400	Quality Control
	01510	Temporary Utilities
	01520	Maintenance of Utility Operations During Construction
	01530	Protection of Existing Facilities
	01550	Site Access
	01560	Temporary Environmental Controls
	01590	Field Office, Equipment and Services
	01600	Materials and Equipment
	01700	Project Closeout
	01710	Cleaning

TECHNICAL SPECIFICATIONS

<u>Division</u>	<u>Section</u>	<u>Title</u>
2		<u>SITWORK</u>
	02100	Clearing, Grubbing, and Site Preparation
	02140	Dewatering
	02160	Temporary Sheet piling and Bracing
	02200	Earthwork
	02202	Excavation By Blasting
	02207	Aggregate Materials
	02214	Excavatable Flowable Fill
	02220	Trenching, Backfilling, and Compacting for Utilities
	02271	Stone Revetment (Rip Rap)
	02274	Geotextiles
	02276	Erosion and Sedimentation Control
	02340	Bored/Tunneled Crossing
	02500	Surface Restoration
	02510	Paving and Surfacing
	02559	Streambed Material for Streamwork (SBM)
	02604	Utility Structures
	02665	Temporary Bypass Pumping
	02910	Final Grading, Seeding and Landscaping
	02960	Traffic Control
3		<u>CONCRETE</u>
	03100	Concrete Formwork
	03200	Reinforcing Steel
	03290	Joints in Concrete
	03300	Cast-In-Place Concrete
	03370	Concrete Curing
	03400	Precast Concrete
	03600	Grout

<u>Division</u>	<u>Section</u>	<u>Title</u>
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5		<u>METALS</u> (NOT USED)
7		<u>THERMAL AND MOISTURE PROTECTION</u> (NOT USED)
9	09900	<u>FINISHES</u> Painting
10		<u>SPECIALTIES</u> (NOT USED)
11		<u>EQUIPMENT</u> (NOT USED)
13		<u>SPECIAL CONSTRUCTION</u> (NOT USED)
15	15000 15006 15008 15390	<u>MECHANICAL</u> Basic Mechanical Requirements Ductile Iron Pipe PVC Solid Wall Gravity Sewer Pipe Schedules
16		<u>ELECTRICAL</u> (NOT USED)
17		<u>CONTROL & INFORMATION SYSTEMS</u> (NOT USED)

Appendices

Appendix A

- US Army Corps of Engineers Nationwide Permit 12
- NCDEQ Sedimentation and Erosion Control Permit
- NCDOT Encroachment Contract
- NCDOT Driveway Permit
- NCDEQ 401 Water Quality Certification
- Duke Energy Transmission Conditional Approval Letter
- Duke Energy Extended NOLO
- NCDEQ Fast-Track Wastewater Collection Permit
- Weddington Flood Study Permit

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**UNION COUNTY
UNION COUNTY, NORTH CAROLINA**

**WEST FORK TWELVE-MILE CREEK INTERCEPTOR
UNION COUNTY PROJECT NO. SW037**

IFB #2021-078

ADVERTISEMENT NOTICE FOR BIDS

Sealed Bids for the construction of the **West Fork Twelve-Mile Creek Interceptor** will be received by the Union County Procurement Department *until* ***11:00 AM** local time on **May 27, 2021** at the Union County Government Center, 500 North Main Street, Suite 709, Monroe North Carolina, 28112. The public bid opening will be conducted outdoors, in the front entrance area of the Union County Government Center at the specified bid date and time. Late bids will not be accepted.

On May 27, 2021, beginning at ***10:30 AM** local time, bids will be received by the Union County Procurement Department at the bid opening location, outdoors in the front entrance area of the Union County Government Center at 500 North Main Street, Monroe, NC 28112. *If you plan to attend the bid opening, masks and social distancing rules apply.*

If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED – 2021-078" and shall be addressed to Union County Procurement Department, Attn: Vicky Watts, 500 North Main Street, Suite 709, Monroe, NC 28112.

The Project consists of constructing **approximately 26,000 linear feet of new sanitary sewer ranging in size from 8 to 24-inches in diameter, manholes, roadway bores, stream crossings, sedimentation and erosion control measures, and restoration of surfaces.**

Bids will be received for a single prime Contract. Bids shall be on a unit price basis.

All questions about the meaning or intent of the Bidding Documents are to be submitted in writing to the Procurement Contact person listed on the cover page, vicky.watts@unioncountync.gov. Deadline for questions is 5:00 PM local time on May 20, 2021.

The Issuing Office for the Bidding Documents is:

Hazen and Sawyer, 9101 Southern Pine Boulevard, Suite 250, Charlotte, NC 28273, Attention: Lisa Thomas, (704) 357-3150, lthomas@hazenandsawyer.com. Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of 9:00 a.m. and 4:00 p.m., (via appointment only) and may obtain copies of the Bidding Documents from the Issuing Office as described below.

Prospective Bidders may also examine the Bidding Documents at the Union County Procurement Department, 500 North Main Street, Suite 709, Monroe, NC 28112 on Mondays through Fridays between the hours of 8:00 am and 5:00 pm by contacting Vicky Watts at 704-283-3601 or via email at vicky.watts@unioncountync.gov.

Printed copies of the Bidding Documents may be obtained from the Issuing Office, during the hours indicated above, upon payment of a deposit of **\$225.00** (non-refundable) for each set. Checks for Bidding Documents shall be payable to **Hazen and Sawyer**. Cost of Bidding Documents includes ground shipping. If Bidding Documents are required to be shipped overnight, Bidder shall provide a six-digit UPS account

number. The date that the Bidding Documents are transmitted by the Issuing Office will be considered the Bidder's date of receipt of the Bidding Documents.

Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A Pre-Bid Meeting will be held at 10:00 a.m. local time on April 28, 2021 at the Union County Operations Center at 4600 Goldmine Road, Monroe, NC 28110 to discuss the Project. Attendance at the Pre-Bid Meeting is highly encouraged but is not mandatory. Immediately following the Pre-Bid Meeting, a tour of the Project site will be conducted for any interested attendees.

Bidders must have a license to do work as a general contractor in the State of North Carolina, as set forth under Article 1 of Chapter 87 of the North Carolina General Statutes. The Contractor's North Carolina License number shall be designated on the outside of the envelope containing the bid.

Bidders are required to comply with the non-collusion requirements set forth in the Bidding Documents.

Bid security shall be furnished in accordance with the Instructions to Bidders.

Union County reserves the right to reject any or all bids including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid and Bidder whom they find, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid and Bidder if the owner believes that would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities and technicalities not involving price, time, or changes in the Work and to negotiate, as allowed by law, contract terms with the Successful Bidder.

Union County encourages good faith effort outreach to Minority Businesses (HUB Certified) and Small Businesses.

+ + END OF ADVERTISEMENT FOR BIDS + +

INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

	Page
ARTICLE 1 – Defined Terms	1
ARTICLE 2 – Copies of Bidding Documents	1
ARTICLE 3 – Qualifications of Bidders	1
ARTICLE 4 – Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site	1
ARTICLE 5 – Bidder’s Representations	3
ARTICLE 6 – Pre-Bid Conference	4
ARTICLE 7 – Interpretations and Addenda.....	4
ARTICLE 8 – Bid Security	5
ARTICLE 9 – Contract Times	5
ARTICLE 10 – Liquidated Damages.....	5
ARTICLE 11 – Substitute and “Or-Equal” Items.....	5
ARTICLE 12 – Subcontractors, Suppliers, and Others	6
ARTICLE 13 – Preparation of Bid	7
ARTICLE 14 – Basis of Bid	7
ARTICLE 15 – Submittal of Bid.....	8
ARTICLE 16 – Modification and Withdrawal of Bid.....	8
ARTICLE 17 – Opening of Bids	8
ARTICLE 18 – Bids to Remain Subject to Acceptance	8
ARTICLE 19 – Evaluation of Bids and Award of Contract	9
ARTICLE 20 – Bonds and Insurance.....	9
ARTICLE 21 – Signing of Agreement.....	9

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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the Advertisement Notice for Bids.

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

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit with its Bid (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

A. Evidence of Bidder's authority to do business in the state where the Project is located.

B. Bidder's state or other contractor license number, if applicable.

C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."

3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:
 - a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply

- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder may tour the proposed pipeline corridor during normal working hours, but must stay within the permanent construction easement. Prior to visiting the site, prospective Bidders shall contact the Owner's Project Manager, Fred Braun, PE at telephone number (971) 312-5894 who may elect to accompany them.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study 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 Supplementary Conditions, especially with respect to Technical Data in such 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 Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;

- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, 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 Bidder; and (3) Bidder's safety precautions and programs;
- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A pre-Bid conference will be held at the time and location stated in the Advertisement Notice for Bids. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference.
- 6.02 Addenda may be issued to clarify, supplement, or change the Bidding Documents. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the to the Procurement contact person listed on the cover page, vicky.watts@unioncountync.gov, in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received after 5:00 pm on May 20, 2021 may not be answered. Only questions answered by Addenda will be binding. All such changes or interpretations will be made in writing in the form of Addenda, and, if issued, will be mailed or sent by available means to all known prospective bidders no later than 12:00 noon on May 24, 2021. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of [5%] percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within ten (10) days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or one (1) day more than the period for which Bids are subject to acceptance, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall comply with the requirements of Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

It is the intent of the Contract Documents to comply with N.C.G.S. §133-3 and to encourage free and open competition on public contracts. However, nothing in this Subparagraph is intended to permit bidders to submit proposals for the use of products or materials which have not been approved by Engineer prior to the receipt of bids as provided by N.C.G.S. §133-3. All submittals for substitution approval shall be made in accordance with the provisions of these Instructions to Bidders:

1. Wherever the Specifications list only required performance and design characteristics for a product or material, bidders wishing to provide such a product or material shall submit such for approval.
2. Where the Specifications list three or more names of products or materials, the listed examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, manufacturer or specific name. Rather, they are used only to set forth and convey to bidders the general style, type, character and quality of product desired. Products of similar general style, type, character appearance, and quality may be submitted for approval.
3. Where the Specifications list fewer than three names of product or material, such products are the only products known to Engineer that comply with the required style, type, character appearance, and quality necessary for this product. Bidders wishing to propose equivalent products may do so.

11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.'

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 In addition to any identification of Subcontractors, Suppliers, individuals, or entities required to be submitted to Owner by the Supplementary Conditions (see third full paragraph below), Bidders shall include in their Bid a list of all subcontractors which the Bidder intends to use.

A contractor whose Bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be nonresponsible or nonresponsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor. The terms, conditions, and requirements of each contract between Contractor and a subcontractor performing work under a subdivision or branch of work listed in this subsection shall incorporate by reference the terms, conditions, and requirements of the Contract between Contractor and Owner. Failure to include this list of subcontractors may cause a Bid to be rejected as nonresponsive by Owner.

If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown. The corporate seal shall be affixed and attested by the corporate secretary or an assistant corporate secretary.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder’s name and official address.
- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder’s authority and qualification to do business in North Carolina, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s North Carolina General Contractor’s license number shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

- 14.01 *Unit Price*
- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
 - B. The “Bid Price” (sometimes referred to as the extended price) for each unit price Bid item will be the product of the “Estimated Quantity” (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.
 - C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor 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.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the Advertisement Notice for Bids and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to:

Union County Procurement Department
Attention: Vicky Watts, Senior Procurement Specialist
500 North Main Street, Suite 709
Monroe, NC 28112

- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 A bid may be modified or withdrawn under the conditions set forth in N.C.G.S §143-129.1. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Advertisement Notice for Bids and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid. Award of a bid by the Owner's governing body represents a preliminary determination as to the qualification of the Bidder, but the Bidder understands and agrees that no legally binding acceptance of Bidder's offer occurs until the Owner's governing body, or its designee, executes a formal contract with the Bidder.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within ten (10) days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

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BID FORM
UNION COUNTY
UNION COUNTY, NORTH CAROLINA
WEST FORK TWELVE-MILE CREEK INTERCEPTOR
UNION COUNTY PROJECT NO. SW037
IFB #2021-078

TABLE OF CONTENTS

	Page
ARTICLE 1 – Bid Recipient	1
ARTICLE 2 – Bidder’s Acknowledgements.....	1
ARTICLE 3 – Bidder’s Representations	1
ARTICLE 4 – Bidder’s Certification.....	2
ARTICLE 5 – Basis of Bid	4
ARTICLE 6 – Time of Completion.....	12
ARTICLE 7 – Attachments to this Bid.....	12
ARTICLE 8 – Defined Terms.....	14
ARTICLE 9 – Bid Submittal	15

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

***Union County Government Center
Attn: Vicky Watts, Senior Procurement Specialist
500 North Main Street, Suite 709
Monroe, NC 28112***

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder 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 Supplementary Conditions, especially with respect to Technical Data in such 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 Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, 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 Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

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ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents and shall identify in the following table (1) his unit price bids for completing all work, (2) predetermined Contingency Allowance, and (3) the Total Bid Price which shall be the sum of the first two items.

- A. The predetermined Contingency Allowance shall be included in the Total Bid Price. This allowance shall be used only upon issuance of a written work order by the Engineer during the Contract. Any unused portion of the allowance remaining at the completion of the Contract shall revert back to the Owner as a credit. The Owner reserves the right to delete the allowance from the Contract prior to award.
- B. Unit Price Pay Item Descriptions are further described in Section 01025, Payment Item Descriptions.

Pay Item A - Furnish and Install New Pipe

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
A-1	Furnish and install new 8" pipe	LF	800	_____	_____
A-2	Furnish and install new 8" DIP	LF	440	_____	_____
A-3	Furnish and install new 12" pipe	LF	20	_____	_____
A-4	Furnish and install new 18" pipe	LF	11,920	_____	_____
A-5	Furnish and install new 24" pipe	LF	7,580	_____	_____
A-6	Furnish and install new 8" RJ DIP	LF	450	_____	_____
A-7	Furnish and install new 18" RJ DIP	LF	1,750	_____	_____
A-8	Furnish and install new 24" RJ DIP	LF	3,150	_____	_____

Pay Item B – Furnish and Install New Manholes

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
B-1	Furnish and install new 4' diameter manhole	Ea	100	_____	_____
B-2	Furnish and install new 5' diameter manhole	Ea	3	_____	_____

Pay Item C – Guaranteed Bored/Tunneled Crossings

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
C-1	Antioch Church Road (Dwg C5)	LF	80	_____	_____
C-2	Beulah Church Road (Dwg C10)	LF	160	_____	_____
C-3	Forest Lawn Drive (Dwg C20)	LF	100	_____	_____

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Pay Item D - Stream Crossings (Permanent and Temporary)

Unit Price Pay Item Description		Units	Estimated Quantity	Unit Price	Bid Price
D-1	S-1 (Temporary) - Dwg C1	LS	1	_____	_____
D-2	S-2 (Permanent) - Dwg C1	LS	1	_____	_____
D-3	S-3 (Temporary) - Dwg C1	LS	1	_____	_____
D-4	S-4 (Temporary) - Dwg C2	LS	1	_____	_____
D-5	S-5 (Permanent) - Dwg C2	LS	1	_____	_____
D-6	S-6 (Permanent) - Dwg C6	LS	1	_____	_____
D-7	S-7 (Permanent) - Dwg C9	LS	1	_____	_____
D-8	S-8 (Temporary) - Dwg C11	LS	1	_____	_____
D-9	S-9 (Permanent) - Dwg C15	LS	1	_____	_____
D-10	S-10 (Temporary) - Dwg C16	LS	1	_____	_____
D-11	S-11 (Permanent) - Dwg C17	LS	1	_____	_____
D-12	S-12 (Permanent) - Dwg C19	LS	1	_____	_____
D-13	S-13 (Temporary) - Dwg C21	LS	1	_____	_____
D-14	S-14 (Temporary) - Dwg C23	LS	1	_____	_____
D-15	S-15 (Permanent) - Dwg C24	LS	1	_____	_____

Pay Item E – Furnish and Install Tie-In Connections

Unit Price Pay Item Description		Units	Estimated Quantity	Unit Price	Bid Price
E-1	24" Sanitary Sewer (Dwg C1)	Ea	1	_____	_____
E-2	Brookhaven Pump Station (Dwg C24)	Ea	1	_____	_____
E-3	Scotch Meadows Pump Station (Dwg C26)	Ea	1	_____	_____
E-4	Grace Meadows Pump Station (Dwg C27)	Ea	1	_____	_____

Pay Item F – Clearing and Grubbing

Unit Price Pay Item Description		Units	Estimated Quantity	Unit Price	Bid Price
F-1	Furnish all equipment and labor for clearing the sewer line easements and temporary construction easements where shown	LS	1	_____	_____

Pay Item G – Provide Temporary Bypass Pumping

Unit Price Pay Item Description		Units	Estimated Quantity	Unit Price	Bid Price
G-1	Furnish, install, maintain and remove all necessary bypass pumps and piping	LS	1	_____	_____

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Pay Item H – Sedimentation and Erosion Control

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
H-1	Furnish, install, maintain and remove all sedimentation and erosion control measures	LS	1	_____	_____

Pay Item I – Landscaping, Seeding and Straw Cover

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
I-1	Furnish all materials and labor required for temporary seeding of disturbed areas	LF	27,950	_____	_____
I-2	Furnish all materials and labor required for final landscaping, seeding and placement of straw over disturbed areas	LF	27,950	_____	_____

**Pay Item J – Rock Excavation
(minimum Unit Cost of \$100/CY by Mechanical Methods and \$75/CY by Blasting)**

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
J-1	Rock excavation by blasting	CY	15,110	_____	_____
J-2	Rock excavation by mechanical methods	CY	7,560	_____	_____

Pay Item K – Additional Stone

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
K-1	Additional Rip-Rap (Class 2)	Ton	100	_____	_____
K-2	Additional stabilization stone (#67)	Ton	500	_____	_____

Pay Item L – Select Backfill (Minimum Unit Cost of \$10/CY)

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
L-1	Select backfill	CY	500	_____	_____

Pay Item M – Abandonment and Demolition of Existing Pump Stations

	Unit Price Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
M-1	Scotch Meadows Pump Station (Dwg C28)	LS	1	_____	_____
M-2	Grace Meadows Pump Station (Dwg C29)	LS	1	_____	_____
M-3	Brookhaven Pump Station (Dwg C30)	LS	1	_____	_____

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Pay Item N – Laterals and Connections

Unit Price	Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
N-1	4" Lateral and connection	Ea	2	_____	_____

Pay Item O – Access Gates and Fencing

Unit Price	Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
O-1	Access Gate and Fencing	Ea	7	_____	_____

Pay Item P – Mobilization (Maximum of 3% of Total Bid Price)

Unit Price	Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
P-1	Mobilization				_____

Pay Item Q – Contingency Allowance

Unit Price	Pay Item Description	Units	Estimated Quantity	Unit Price	Bid Price
Q-1	Contingency Allowance				<u>\$200,000</u>

Total Bid Price (Items A-Q) _____

The TOTAL BID PRICE for completing all work included in the Contract shall be as follows (enter amount of Bid as shown above in words and numerals):

 _____ Dollars and _____
 Cents (\$ _____).

CONTRACTOR: _____
 (Print)

Bidder acknowledges that (1) each unit price Bid item includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

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ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete within 540 consecutive calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 570 consecutive calendar days after the date when the Contract Times commence to run.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid Security
 - B. List of Proposed Manufacturers/Subcontractors
 - C. Evidence of authority to do business in North Carolina; or a written covenant to obtain such license within the time for acceptance of Bids
 - D. General Contractor’s North Carolina License Number: _____
 - E. Required Qualifications of Bidder with supporting data

CERTIFIED LIST OF PROPOSED MANUFACTURERS/ SUBCONTRACTORS

As part of the procedure for submission of Bids on this project known as **West Fork Twelve-Mile Creek Interceptor**, Bidder submits the following lists of Subcontractors and Suppliers to be used in the performance of work to be done on said Project. The lists furnished shall be based on requirements of the Contract Documents. Changes to this list after the Bid opening shall only be as approved by the Owner upon request by the Contractor or as required by the Owner based upon review of Contractor's submittals.

CATEGORY	MANUFACTURER/SUBCONTRACTOR
Ductile Iron Pipe Manufacturer	
PVC Solid Wall Pipe Manufacturer	
Manhole Manufacturer	
Jack-and-Bore Subcontractor	
Blasting Subcontractor	

QUALIFICATIONS OF BIDDERS

In order to assist the Owner in determining whether the Bidder is qualified to perform the Work, the Bidder shall furnish the following information with his Bid. **Items 1 through 4 must be submitted with the Bid.**

1. List of references who are qualified to judge as to his financial responsibility and his experience in work of similar nature to that bid upon.
2. List of previous contracting experience, including dollar values of contracts.
3. List of facilities or equipment that is available for use.
4. Name, residence, and title of the individual who will give personal attention to the work.
5. Financial Statement.

ASSETS

CURRENT ASSETS:

Cash	\$ _____
Notes and Accounts Receivable	_____
Inventories	_____

PLANT ASSETS:

Real Estate	\$ _____
Machinery	_____
Good Will, Patents, etc.	_____ \$ _____

LIABILITIES:

Notes Payable	\$ _____
Accounts Payable	\$ _____
Accrued Wages	_____
Other Liabilities	_____ \$ _____

EXCESS OF ASSETS OR NET WORTH	\$ _____
-------------------------------------	----------

Notes:

- A. The above is a suggested form for the Financial Statement, and the Bidder is not required to follow the form explicitly. The Financial Statement submitted must clearly show to the satisfaction of the Owner the Bidders current financial condition. The Owner reserves the privilege of requiring additional information as to financial responsibility of the Bidder prior to awarding Contract.
- B. Bidder shall attach additional pages, if necessary, in order to complete the required information.
- C. The Bidder shall submit detailed information required for above items 1 through 4 with his Bid package and at the discretion of the Bidder the information required under Item 5 can be furnished after Bids are received if required by the Owner and Engineer to evaluate the financial qualifications of a prospective Bidder.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature] _____

[Printed name] _____

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Bidder's License No.: _____

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name and Include Location*):

BOND

Bond Number:

Date (*Not earlier than Bid due date*):

Penal sum _____ \$ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Notice of Award

Date: _____

Project: _____

Owner: _____

Owner's Contract No.: _____

Contract: _____

Engineer's Project No.: _____

Bidder: _____

Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars (\$_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within thirty days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Owner
By: _____
Authorized Signature

Title

Copy to Engineer

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations. **This document has been modified by Owner. Changes are shown in bold text with additions underlined and deletions struck through.**

SUGGESTED FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

This Suggested Form of Agreement has been prepared for use with the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition). Their provisions are interrelated, and a change in one may necessitate a change in the other. The language contained in the Suggested Instructions to Bidders (EJCDC C-200, 2007 Edition) is also carefully interrelated with the language of this Agreement. Their usage is discussed in the Narrative Guide to the 2007 EJCDC Construction Documents (EJCDC C-001, 2007 Edition).

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**SUGGESTED FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (UNIT PRICE)**

THIS AGREEMENT is by and between _____ UNION COUNTY _____ (“Owner”) and

_____ (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

UNION COUNTY, NORTH CAROLINA
WEST FORK TWELVE-MILE CREEK INTERCEPTOR
UNION COUNTY PROJECT NO. SW037
IFB #2021-078

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

The project consists of a Single Prime Unit Price Contract for installation of approximately 26,000 LF of new sanitary sewer pipe ranging in size from 8 to 24-inches in diameter, manholes, roadway bores, stream crossings, sedimentation erosion control measures, and restoration of surfaces.

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Hazen and Sawyer (Engineer), which is to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Interim Milestone, Substantial Completion, and Final Payment*

- A. The Work will be substantially completed within 540 consecutive calendar days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 570 consecutive calendar days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02.A above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal ~~or arbitration~~ proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$500.00 for each day that expires after the time specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$500.00 for each day that expires after the time specified in Paragraph 4.02.A above for completion and readiness for final payment until the Work is completed and ready for final payment.
- B. **In addition to liquidated damages, Contractor shall reimburse Owner all fees and costs paid to or incurred by Engineer in administering the construction of the Project beyond the times specified in Paragraph 4.02 above for Substantial and Final Completion. All fees and costs may be deducted from monies due Contractor for the performance of the Work.**

ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A below:
 - A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that ~~item:~~ **item. Unit Prices are as specified in Contractor’s Bid.** Amounts expended pursuant to this Agreement shall not exceed _____ Dollars (\$ _____) without written amendment hereto duly executed by both parties.

UNIT PRICE WORK

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Bid Unit Price</u>	<u>Bid Price</u>
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Total of all Bid Prices (Unit Price Work) \$ _____

The Bid prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.06 of the General Conditions.

B. For all Work, at the prices stated in Contractor’s Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions. **Owner shall make payments within thirty (30) days after presentation of the Application for Payment to Owner by Engineer with Engineer’s recommendation for payment.**

6.02 *Progress Payments; Retainage*

A. Owner shall make **monthly** progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment ~~on or about the _____ day of each month~~ during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.
 - a. **95%** percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

- b. 95% percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100% percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200% percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 4% percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
 - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
 - E. Contractor has considered the information known to Contractor; 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, 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, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are **generally** sufficient to indicate and convey **an** understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. This Agreement (pages 1 to __, inclusive).
 - 2. Performance bond (pages ____ to ____, inclusive).
 - 3. Payment bond (pages ____ to ____, inclusive).
 - 4. Other bonds (pages ____ to ____, inclusive).
 - a. ____ (pages ____ to ____, inclusive).
 - b. ____ (pages ____ to ____, inclusive).
 - c. ____ (pages ____ to ____, inclusive).
 - 5. General Conditions (pages ____ to 68, inclusive).
 - 6. Supplementary Conditions (pages ____ to ____, inclusive).
 - 7. Specifications as listed in the table of contents of the Project Manual.
 - 8. Drawings for the West Fork Twelve-Mile Creek Interceptor, dated April 2021. **Drawings are separately bound and therefore not attached to this Agreement.**
 - 9. Addenda (numbers ____ to ____, inclusive).

10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages ____ to ____, inclusive).
 - b. Documentation submitted by Contractor prior to Notice of Award (pages ____ to ____, inclusive).
11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed (pages ____ to ____, inclusive).
 - b. Work Change Directives.
 - c. Change Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are 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.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:

CONTRACTOR

UNION COUNTY

By: _____

By: _____

Title: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

License No.: _____
(North Carolina)

Agent for service of process:

Notice to Proceed

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Contractor:	
Contractor's Address: <i>[send Certified Mail, Return Receipt Requested]</i>	

You are notified that the Contract Times under the above Contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____ [(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ *[add other requirements]*.

_____	Owner
_____	Given by:
_____	Authorized Signature
_____	Title
_____	Date

Copy to Engineer

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PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

(seal)

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of

the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years

after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

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PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

(2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond

shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

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Contractor's Application for Payment No.

Application Period:	Application Date:	
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment
Change Order Summary**

Approved Change Orders			
Number	Additions	Deductions	
			1. ORIGINAL CONTRACT PRICE..... \$ _____
			2. Net change by Change Orders..... \$ _____
			3. Current Contract Price (Line 1 ± 2)..... \$ _____
			4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)..... \$ _____
			5. RETAINAGE:
			a. X _____ Work Completed..... \$ _____
			b. X _____ Stored Material..... \$ _____
			c. Total Retainage (Line 5a + Line 5b)..... \$ _____
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... \$ _____
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
			8. AMOUNT DUE THIS APPLICATION..... \$ _____
			9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)..... \$ _____
TOTALS			
NET CHANGE BY CHANGE ORDERS			

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By: _____ Date: _____

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ (Funding Agency (if applicable)) _____ (Date)

Certificate of Substantial Completion

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

This document has been modified by Owner. Changes are shown in bold text with additions underlined and deletions struck through. The Table of Contents has been updated to reflect modifications.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

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Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms.....	1
1.02 Terminology	5
Article 2 – Preliminary Matters.....	6
2.01 Delivery of Bonds and Evidence of Insurance.....	6
2.02 Copies of Documents.....	6
2.03 Commencement of Contract Times; Notice to Proceed	6
2.04 Starting the Work.....	7
2.05 Before Starting Construction	7
2.06 Preconstruction Conference; Designation of Authorized Representatives	7
2.07 Initial Acceptance of Schedules	7
Article 3 – Contract Documents: Intent, Amending, Reuse.....	8
3.01 Intent.....	8
3.02 Reference Standards	8
3.03 Reporting and Resolving Discrepancies	9
3.04 Amending and Supplementing Contract Documents	9
3.05 Reuse of Documents	10
3.06 Electronic Data.....	10
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	10
4.01 Availability of Lands	10
4.02 Subsurface and Physical Conditions	11
4.03 Differing Subsurface or Physical Conditions.....	12
4.04 Underground Facilities	13
4.05 Reference Points	14
4.06 Hazardous Environmental Condition at Site.....	14
Article 5 – Bonds and Insurance	16
5.01 Performance, Payment, and Other Bonds	16
5.02 Licensed Sureties and Insurers	17
5.03 Certificates of Insurance	17
5.04 Contractor’s Insurance.....	17
5.05 Owner’s Liability Insurance	20
5.06 Property Insurance	20
5.07 Waiver of Rights	22
5.08 Receipt and Application of Insurance Proceeds	23
5.09 Acceptance of Bonds and Insurance; Option to Replace.....	23

5.10	Partial Utilization, Acknowledgment of Property Insurer	23
Article 6 – Contractor’s Responsibilities		
6.01	Supervision and Superintendence	24
6.02	Labor; Working Hours.....	24
6.03	Services, Materials, and Equipment.....	24
6.04	Progress Schedule	25
6.05	Substitutes and “Or-Equals”	25
6.06	Concerning Subcontractors, Suppliers, and Others	27
6.07	Patent Fees and Royalties	28
6.08	Permits.....	29
6.09	Laws and Regulations.....	29
6.10	Taxes	30
6.11	Use of Site and Other Areas	31
6.12	Record Documents.....	32
6.13	Safety and Protection	32
6.14	Safety Representative	33
6.15	Hazard Communication Programs	33
6.16	Emergencies	33
6.17	Shop Drawings and Samples	33
6.18	Continuing the Work	35
6.19	Contractor’s General Warranty and Guarantee.....	36
6.20	Indemnification	36
6.21	Delegation of Professional Design Services	37
Article 7 – Other Work at the Site.....		
7.01	Related Work at Site	38
7.02	Coordination.....	38
7.03	Legal Relationships.....	39
7.04	<u>Damage to Work of Another Contractor</u>	39
Article 8 – Owner’s Responsibilities		
8.01	Communications to Contractor.....	39
8.02	Replacement of Engineer.....	39
8.03	Furnish Data	39
8.04	Pay When Due	39
8.05	Lands and Easements; Reports and Tests	40
8.06	Insurance	40
8.07	Change Orders	40
8.08	Inspections, Tests, and Approvals	40
8.03	Limitations on Owner’s Responsibilities	40
8.04	Undisclosed Hazardous Environmental Condition	40
8.04	Evidence of Financial Arrangements	40
8.05	Compliance with Safety Program.....	40
Article 9 – Engineer’s Status During Construction		
9.01	Owner’s Representative.....	41
9.02	Visits to Site	41

9.03	Project Representative	41
9.04	Authorized Variations in Work	41
9.05	Rejecting Defective Work	42
9.06	Shop Drawings, Change Orders and Payments	42
9.06	Determinations for Unit Price Work	42
9.07	Decisions on Requirements of Contract Documents and Acceptability of Work	42
9.08	Limitations on Engineer's Authority and Responsibilities.....	43
9.09	Compliance with Safety Program.....	43
Article 10 – Changes in the Work; Claims		43
10.01	Authorized Changes in the Work	43
10.02	Unauthorized Changes in the Work	44
10.03	Execution of Change Orders.....	44
10.04	Notification to Surety.....	44
10.05	Claims.....	44
Article 11 – Cost of the Work; Allowances; Unit Price Work.....		45
11.01	Cost of the Work.....	45
11.02	Allowances.....	48
11.03	Unit Price Work	49
Article 12 – Change of Contract Price; Change of Contract Times.....		49
12.01	Change of Contract Price.....	49
12.02	Change of Contract Times.....	50
12.03	Delays.....	51
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....		51
13.01	Notice of Defects	51
13.02	Access to Work	51
13.03	Tests and Inspections	52
13.04	Uncovering Work	52
13.05	Owner May Stop the Work.....	53
13.06	Correction or Removal of Defective Work.....	53
13.07	Correction Period.....	53
13.08	Acceptance of Defective Work	54
13.09	Owner May Correct Defective Work.....	55
Article 14 – Payments to Contractor and Completion.....		55
14.01	Schedule of Values	55
14.02	Progress Payments	56
14.03	Contractor's Warranty of Title	58
14.04	Substantial Completion.....	58
14.05	Partial Utilization	59
14.06	Final Inspection.....	60
14.07	Final Payment	60
14.08	Final Completion Delayed.....	61
14.09	Waiver of Claims	61

Article 15 – Suspension of Work and Termination	62
15.01 Owner May Suspend Work	62
15.02 Owner May Terminate for Cause	62
15.03 Owner May Terminate For Convenience.....	63
15.04 Contractor May Stop Work or Terminate	63
Article 16 – Dispute Resolution	64
16.01 Methods and Procedures.....	64
Article 17 – Miscellaneous	65
17.01 Giving Notice	65
17.02 Computation of Times	65
17.03 Cumulative Remedies	65
17.04 Survival of Obligations	65
17.05 Controlling Law	65
17.06 Headings.....	65
17.07 <u>E-Verify</u>	66
17.08 <u>Iran Divestment Act</u>	66
17.09 <u>Confidentiality</u>	66
17.10 <u>Severability</u>	66

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer **and Owner** which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders **(including any bid schedule)**, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written ~~agreement~~ **Agreement** between the Owner and Contractor concerning the Work. The Contract supersedes prior **and contemporaneous** negotiations, representations, or agreements, whether written or oral. **The Contract may**

not be modified or altered except by a writing signed by both the Owner and Contractor.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—~~Sections of~~ Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *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.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals **and Shop Drawings** and the time requirements to support scheduled performance of related construction activities.
39. *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.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *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 at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of 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 **or occupied** for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or **a specified** part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *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 Subcontractor.
48. *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 those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *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, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. 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 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 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 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 of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. 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.
 2. 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.
 3. 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.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. 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 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ~~ten~~ **five** printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run ~~on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given,~~ on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. ~~In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.~~

2.04 *Starting the Work*

- A. 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 the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner, **Engineer,** and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the ~~schedules~~ **Progress Schedule** submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the ~~schedules.~~ **Progress Schedule.** No progress payment shall be made to Contractor until **an acceptable** ~~schedules are~~ **Project Schedule is** submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on 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.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are **complementary; fully-integrated;** what is required by ~~one~~ **each document which is part of the Contract Documents** is as binding as if required ~~by~~ **or set forth in all of the Contract Documents.**
- B. It is the intent of the Contract Documents to describe a functionally complete ~~project~~ **Project** (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, 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, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, 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 Owner, Engineer, or any of their 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, 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) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. 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).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must

comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- 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.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

C. **Site Visit: Contractor represents that is has visited the Site and has become familiar with and satisfied as to the general, local, and Site conditions that may affect cost, progress, performance, and furnishing of the Work.**

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
 2. is of such a nature as to require a change in the Contract Documents; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. 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 within twenty-four (24) hours** after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer **will promptly shall within seven (7) calendar days** review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent 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, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs ~~9.07~~ **9.06** and 11.03-; **and**
 - c. **Contractor shall not be entitled to, and Owner shall not be liable for, any remobilization fees or equipment charges as a result of any work stoppage pursuant to Paragraph 4.03.**
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

- b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information, ~~and~~ **data, and locations** shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, **promptly within twenty-four (24) hours** after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer ~~will promptly~~ **shall within forty-eight (48) hours** review

the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such ~~consequences.~~ **change.** An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument 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 property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall **promptly within seven (7) calendar days** consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. ~~Promptly after~~ **After** consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner 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, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner’s own forces or others in accordance with Article 7.
- ~~G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against 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 a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by~~

~~Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.~~

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

The Contractor shall provide surety bonds wherein surety waives notice of any and all modifications, omissions, additions, changes and advance payments or deferred payments in or about the Contract, and agrees that the obligations undertaken by the bond shall not be impaired in any manner by reason of such modifications, omissions, additions, changes, and advance payments or deferred payments. The surety bond must set forth no requirement that suit be initiated prior to the time stipulated in applicable North Carolina statutes of limitation.

- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner

and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required **and have a financial standing rating from A.M. Best Company equal to or better than A-VII**. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in ~~the Supplementary Conditions~~ **Paragraph 5.04(C)** or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

- 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

C. The Policies of insurance required by Paragraph 5.04 shall include the specific coverages and be written for not less than the limits of liability provided below or required by Laws or Regulations, whichever is greater.

Worker's Compensation and Employer's Liability Insurance. This insurance shall protect Contractor against all claims under applicable state workers' compensation laws, including coverage as necessary for the benefits provided under the United States Longshoremen's and Harbor Workers' Act and the Jones Act. Contractor shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workers' compensation law. This policy shall include an "all states" or "other states" endorsement.

The liability limits shall be not less than:

<u>Workers' compensation</u>	<u>Statutory</u>
<u>Employers' liability</u>	<u>\$1,000,000 each occurrence</u>

Business Automobile Liability Insurance. This insurance shall be occurrence type, written on Insurance Services Office (ISO) form CA 00 01, or a substitute form providing equivalent liability coverage, and shall protect Contractor, Owner, and Engineer as additional insureds, against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, either on or off the project site whether they are owned, nonowned, or hired.

The liability limits shall be not less than:

<u>Bodily injury and property damage</u>	<u>\$1,000,000 combined single limit for each occurrence</u>
---	---

Commercial General Liability Insurance. This insurance shall be written on ISO “occurrence” form CG 00 01 or its equivalent, and shall protect Contractor, Owner, and Engineer as additional insureds, against claims arising from injuries, sickness, disease, or death of any person or damage to property arising out of performance of the Work. The Owner shall be included as an additional insured by ISO endorsements CG 20 10 or CG 20 33 and CG 20 37 or their equivalents; and the Engineer as additional insured by ISO endorsement CG 20 07 or CG 20 32 or its equivalent. The policy shall also include a per project aggregate limit endorsement, personal injury liability coverage, contractual liability coverage, completed operations and products liability coverage, and coverage for blasting, explosion, collapse of buildings, and damage to underground property.

The liability limits shall be not less than:

<u>Bodily injury and property damage</u>	<u>\$1,000,000 combined single limit for each occurrence</u>
	<u>\$1,000,000 general aggregate</u>

Umbrella Liability Insurance. This insurance shall protect Contractor, Owner, and Engineer as additional insureds, against claims in excess of the limits provided under workers' compensation and employers' liability, business automobile liability, and commercial general liability policies. The umbrella policy shall follow the form of the primary insurance, including the application of the primary limits.

The liability limits shall be not less than:

<u>Bodily injury and property damage</u>	<u>\$4,000,000 combined single limit for each occurrence</u>
	<u>\$4,000,000 general aggregate</u>

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, ~~Owner~~ **Contractor** shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
2. be written on a Builder's Risk "all-risk" policy form that shall at **a minimum cover the perils under the ISO special causes of loss policy form (CP 10 30) and least** include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

CONTRACTOR shall purchase and maintain boiler and machinery insurance required by the contract documents or by law, covering insured objects during installation and until final acceptance by Owner. In lieu of this separate policy, the contractor may have the boiler and machinery exclusion removed from the builder's risk policy.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

- ~~D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~
- E. If ~~Contractor~~ Owner requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, ~~Owner~~ Contractor shall, if possible, include such insurance, and the cost thereof will be charged to ~~Contractor~~ Owner by appropriate Change Order. Prior to commencement of the Work at the Site, ~~Owner~~ Contractor shall in writing advise ~~Contractor~~ Owner whether or not such other insurance has been procured by ~~Owner~~. Contractor.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner ~~as fiduciary~~ for the loss payees, as their interests may appear, subject to the requirements of ~~any applicable mortgage clause and of~~ Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner ~~as fiduciary~~ shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner ~~as fiduciary~~ shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner ~~as fiduciary~~ shall adjust and settle the loss with the insurers ~~and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.~~

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by

endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto 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. **Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.**
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer **except under extraordinary circumstances.**

6.02 *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.
- 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 during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *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 Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, 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 provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "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 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. "*Or-Equal*" Items: If in Engineer's sole discretion 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, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) 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; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will **prejudice** **delay** Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer 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. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *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 which 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 Owner or Engineer, 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 Owner in the Contract Documents.

- ~~B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against 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 any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.~~
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against 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 any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, ~~Contractor~~ Owner shall obtain and pay for all construction permits and licenses. ~~Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement.~~ Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear 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 Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

- B. **Pursuant to N.C.G.S. § 105-164.14, Owner is eligible for sales and use tax refunds on all materials which become a permanent part of the construction. Contractor agrees to provide Owner such documentation as may be necessary to meet the requirements of the North Carolina Department of Revenue regarding requests for refund of sales and use taxes. Such requirements include those described in the North Carolina Department of Revenue Sales and Use Tax Technical Bulletins § 18-2(F), outlined below:**

1. **To substantiate a refund claim for sales or use taxes paid on purchases of building materials, supplies, fixtures, and equipment by a contractor, Owner must secure from a contractor certified statements setting forth the specific required information. A “certified statement” is a statement signed by a contractor’s owner, a corporate officer of a contractor, or an employee of a contractor who is authorized to provide information set forth in the statement. The certified statement must include all of the following information:**
 - a. **The date the property was purchased;**
 - b. **The type of property purchased;**
 - c. **The cost of property purchased and the amount of sales and use taxed paid thereon;**
 - d. **The vendor from whom the property was purchased;**
 - e. **The project for which the property was purchased;**
 - f. **If the property was purchased in the State of North Carolina, the county to which it was delivered, or, if the property was not purchased in the State of North Carolina, the county in which the property was used; and**
 - g. **The invoice number of the purchase.**
2. **In the event Contractor makes several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, and the State and local sales and use taxes paid thereon. Such statement must also include the cost of any tangible personal property withdrawn from Contractor’s warehouse stock and the amount of State and local sales or use tax paid thereon by Contractor. Any local sales or use taxes included in Contractor’s**

statements must be shown separately from the State sales or use taxes. Contractor's statements must not contain sales or use taxes paid on purchases of tangible personal property purchased by Contractor for use in performing the Contract which does not annex to, affix to or in some manner become a part of the building or structure that is owned or leased by a governmental agency and is being erected, altered or repaired for use by a governmental entity as defined by N.C.G.S. § 105-164.14(c). Examples of property on which sales or use tax has been paid by Contractor and which shall not be included in Contractor's certified statement are scaffolding, forms for concrete, fuel for the operation of machinery and equipment, tools, equipment, equipment repair parts and equipment rentals. Similar certified statements by Subcontractors must be obtained by Contractor and furnished to Owner.

3. **Contractor shall submit notarized sales tax certificates which meet the requirements detailed above with each Application for Payment. Payment will not be made until the sales tax certificate(s) have been submitted to Owner. Owner is the recipient of sales tax refunds and no such funds shall be provided to Contractor, or claim made by Contractor therefor.**

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by ~~arbitration or other~~ dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against 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 any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site 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. *Loading Structures:* 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 property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *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:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 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, shall be remedied by Contractor ~~(except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).~~
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate 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.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *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 act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer 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.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give 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 both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and 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.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and ~~submit~~, **resubmit**, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals. **All resubmittals by Contractor to Engineer shall be within fourteen (14) calendar days after receipt by Contractor unless additional time is approved in writing by Engineer.**

F. **Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three (3) submittals. Engineer will record Engineer's time for reviewing submittals subsequent to the third submittal and Contractor shall reimburse Owner for Engineer's charges for such time.**

G. **In the event Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time.**

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. 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:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against 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 the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission 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 .

- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) 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, the indemnification obligation under Paragraph 6.20.A 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.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *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 law.
- 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, Owner and Engineer 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, Shop Drawings 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 Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, ~~provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.~~
- D. Pursuant to this Paragraph 6.21, Engineer'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. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
- ~~1. written notice thereof will be given to Contractor prior to starting any such other work; and~~
 - ~~2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.~~
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work **with theirs. in accordance with Section 7.02.** Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

7.04 *Damage to Work of Another Contractor*

- A. *Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Owner or Engineer, Contractor shall promptly attempt to settle with such contractor by agreement, or otherwise resolve the dispute by mediation or at law.*

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer ~~to whom Contractor makes no reasonable objection~~, whose status under the Contract Documents shall be that of the former Engineer.

~~8.03 *Furnish Data*~~

- ~~A. Owner shall promptly furnish the data required of Owner under the Contract Documents.~~

~~8.04 *Pay When Due*~~

- ~~A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.~~

~~8.05 — *Lands and Easements; Reports and Tests*~~

- ~~A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.~~

~~8.06 — *Insurance*~~

- ~~A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.~~

~~8.07 — *Change Orders*~~

- ~~A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.~~

~~8.08 — *Inspections, Tests, and Approvals*~~

- ~~A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.~~

8.03 *Limitations on Owner's Responsibilities*

- A. The Owner 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. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

~~8.04 — *Undisclosed Hazardous Environmental Condition*~~

- ~~A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.~~

8.04 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.05 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

- A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or 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.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph ~~9.09~~, **9.08**. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or

Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

~~9.06 *Shop Drawings, Change Orders and Payments*~~

- ~~A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.~~
- ~~B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.~~
- ~~C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.~~
- ~~D. In connection with Engineer's authority as to Applications for Payment, see Article 14.~~

9.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within ~~30~~ **seven (7)** **calendar** days of the event giving rise to the question.
- B. Engineer will, ~~with reasonable promptness,~~ **within seven (7) days,** render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or 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. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, **unilaterally** order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive, **including, but not limited to, variations in quantities between estimated and actual quantities**. Upon receipt of any such document, Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *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 as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *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.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may

otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract ~~promptly (but in no event later than 30 days)~~ **within seven (7) calendar days** after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ **thirty (30)** days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written **statement certification** that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within ~~30~~ **twenty (20)** days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in **strict** accordance with this Paragraph 10.05 **and failure to submit such Claim in strict accordance with this Paragraph 10.05 shall be deemed a WAIVER of such Claim.**

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an

adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, ~~bonuses~~, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. **If prior written approval by Owner is obtained, costs** ~~Costs~~ of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. **If prior written approval by Owner is obtained, the** ~~The~~ proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost,

less market value, of such items used but not consumed which remain the property of Contractor.

- c. Rentals of all construction equipment and machinery, and the parts thereof ~~whether rented from Contractor or others~~ in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05. **No change in the Contract Price will be approved for defective pricing upon Bid submission and award, or errors in bidding.**
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. 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:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost 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
 - f. 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 in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. 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.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests 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.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- 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 Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

- C. If it is found that the uncovered Work is defective, 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 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 Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. 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, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient 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, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner 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.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. 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 removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one 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 land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
 2. correct such defective Work; or
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. 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) will be paid by Contractor.
- 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 if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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 Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. 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) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within ~~a reasonable time~~ **fourteen (14) calendar days** after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, 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, Owner may, after ~~seven~~ **fourteen (14) calendar** days written notice to Contractor, correct, or remedy any such deficiency. **If additional time is required due to unforeseen circumstances, a written notice is required detailing the circumstances and delay within seven (7) days of written notice from Engineer.**
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. 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) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. 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 Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to 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 at 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 Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. 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.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within ~~10~~ **fourteen (14) calendar** days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. 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 under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. 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 Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. ~~Ten~~ **Thirty (30)** days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens (**whether or not permissible**) have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended **including but not limited to liquidated damages**; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the

Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a **tentative preliminary** certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a **definitive final** certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner 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 tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, 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, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or

receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, 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.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 Owner May Terminate for Cause

- A. The occurrence of any one or more of the following events will justify termination for cause:
 1. Contractor's persistent 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 established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
 1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.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 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such

unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. 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;
 - 2. 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;
 - 3. 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on

any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 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.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. **In accordance with N.C.G.S. § 143-128(f1), Owner and Contractor agree to use the dispute resolution process adopted by the North Carolina State Building Commission pursuant to G.S. 143-135.26(11). This dispute resolution process will be available to all parties involved in the Project including Owner, Architect, Contractor, and the first-tier and lower-tier Subcontractors, and it shall be available for any issues arising out of the Contract or construction process, provided that the amount in controversy is \$15,000 or more. Contractor shall make this process available to its Subcontractors by inclusion of this provision in the Subcontractor agreements. Costs of the process will be divided between the parties to the dispute with at least one-third of the cost to be paid by Owner, if Owner is a party to the dispute. Participation in mediation concerning a dispute shall be a precondition to initiating litigation concerning the dispute.** Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. ~~The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement.~~ The request for mediation shall be submitted in writing to the ~~American Arbitration Association and the~~ other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
- ~~1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or~~
 1. agrees with the other party to submit the Claim to another dispute resolution process; or

2. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *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:
 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents 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.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto 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.

17.04 *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 Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

17.07 E-Verify

A. E-Verify is the federal program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program, used to verify the work authorization of newly hired employees pursuant to federal law. Contractor shall ensure that Contractor and any Subcontractor performing work under this Contract: (i) uses E-Verify if required to do so; and (ii) otherwise complies with applicable law.

17.08 Iran Divestment Act

A. Pursuant to Article 6A of Chapter 143C of the North Carolina General Statutes, Owner must require most entities with which it contracts, which would include Contractor under this Contract, to certify that the entity is not identified on a list created by the State Treasurer pursuant to N.C.G.S. § 143C-6A-4 (the “Final Divestment List”). This requirement is related to ensuring that entities with which local governments contract are not involved in investment activities in Iran. Contractor certifies that: (i) it is not listed on the Final Divestment List, and (ii) it will not utilize any Subcontractor performing work under this Contract which is listed on the Final Divestment List.

17.09 Confidentiality

A. Contractor warrants and represents that Contractor shall not knowingly or negligently communicate or disclose at any time to any person or entity any information in connection with the Work or the Project (including, without limitation, information containing specific details of public security plans and arrangements or the detailed plans and drawings of public buildings and infrastructure facilities), except (i) with prior written consent of Owner, (ii) information that was in the public domain prior to the date of this Agreement, (iii) information that becomes part of the public domain by publication or otherwise not due to any unauthorized act or omission of Contractor, or (iv) as may be required to perform the Work by any applicable law, including any set of Drawings, Specifications, and other documents which Contractor is permitted to retain. Specific information shall not be deemed to fall within the scope of the foregoing exceptions merely because it is embraced by more generic information which falls within the scope of one or more of those exceptions. Contractor shall not disclose to others that specific information was received from Owner even though it falls within the scope of one or more of those exceptions. Contractor acknowledges and agrees that the existence of the Owner’s particular interests and plans in the geographical area of the Project is a type of such specific information. In the event that Contractor is required by any court of competent jurisdiction or legally constituted authority to disclose any such of Owner’s information, prior to any disclosure thereof, Contractor shall notify Owner and shall give Owner the opportunity to challenge any such disclosure order or to seek protection for those portions that it regards as confidential.

17.10 Severability

A. The provisions hereof are severable, and should any provision be determined to be invalid, unlawful or otherwise null and void by any court of competent jurisdiction, the other provisions shall remain in full force and effect and shall not thereby be affected unless such

ruling shall make further performance hereunder impossible or impose an unconscionable burden upon one of the parties. The parties shall endeavor in good faith to replace the invalid, illegal, or unenforceable provisions with valid provisions the economic effect of which comes as close as practicable to that of the invalid, illegal, or unenforceable provisions.

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Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2007 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-4.02 *Subsurface and Physical Conditions*

SC-4.02 Add the following new paragraphs immediately after Paragraph 4.02.A:

The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

1. Report dated January 16, 2018, prepared by S&ME, Inc., Charlotte, NC, entitled: "Report of Subsurface Exploration West Fork Twelve Mile Creek Interceptor Union County, North Carolina, S&ME Project No. 1335-17-037" (appended to Section 01010). The Technical Data contained in such report upon whose accuracy Contractor may rely are none.

SC-4.06 *Hazardous Environmental Conditions*

SC 4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

SC-6.02 *Labor; Working Hours*

Paragraph 6.02.B of the General Conditions restricts Contractor to working during "regular hours" Monday through Friday, and no work is permitted on "legal holidays."

SC-6.02.B. Add the following new subparagraphs immediately after Paragraph 6.02.B:

1. Regular working hours will be 7:00 am to 6:00 pm.
2. Owner's legal holidays are:
 - a. New Year's Day
 - b. Martin Luther King, Jr.'s Birthday
 - c. Good Friday
 - d. Memorial Day

- e. Independence Day
- f. Labor Day
- g. Veterans Day
- h. Thanksgiving Day
- i. Day after Thanksgiving
- j. Christmas Eve
- k. Christmas Day
- l. Day after Christmas

SC-6.19 Contractor's Warranty of Title

SC-6.19 Add the following new paragraph immediately after Paragraph 6.19.C:

- D. The Contractor shall obtain a guaranty/warranty from each manufacturer of all major pieces of material and equipment furnished and installed on this Project. Such guaranty/warranty shall be for the benefit of the Owner and be furnished in writing by the manufacturer.**

The manufacturer shall warrant and guarantee for a period of 1-year from the date of Substantial Completion, or such longer period that may be specified in the Contract Documents, that all materials and equipment furnished and installed shall be free from flaws and defects in material and workmanship and shall be in conformance with the Contract Documents.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-9.03 Project Representative

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
 - 1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.**
 - 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.**
 - 3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.**
 - 4. Liaison:**
 - a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in**

- providing information regarding the provisions and intent of the Contract Documents.
- b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
- a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
- a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
9. Inspections, Tests, and System Start-ups:
- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a

final punch list of items to be completed and deficiencies to be remedied.

- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-11.03 Unit Price Work

SC-11.03 Add the following new paragraphs immediately after Paragraph 11.03.D:

- E. Owner or Contractor may NOT make a Claim for adjustment in the Contract Price in accordance with Paragraph 10.05 for the Unit Price Pay Item J – Rock Excavation; Pay Item K – Additional Stone; and Pay Item L – Select Backfill.

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Work Change Directive No.

Date of Issuance: _____ Effective Date: _____
 Owner: _____ Owner's Contract No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Project: _____ Contract Name: _____

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price \$ _____ [increase] [decrease].
 Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:

AUTHORIZED BY:

RECEIVED:

By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

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Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:	Date of Contract:	
Contractor:	Engineer's Project No.:	

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

CHANGE IN CONTRACT TIMES:

Original Contract Price:
\$ _____

Original Contract Times: Working Calendar days
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____
\$ _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:
Substantial completion (days): _____
Ready for final payment (days): _____

Contract Price prior to this Change Order:
\$ _____

Contract Times prior to this Change Order:
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:
\$ _____

[Increase] [Decrease] of this Change Order:
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

Contract Price incorporating this Change
\$ _____

Contract Times with all approved Change Orders:
Substantial completion (days or date): _____
Ready for final payment (days or date): _____

RECOMMENDED:
By: _____
Engineer (Authorized Signature)

ACCEPTED:
By: _____
Owner (Authorized Signature)

ACCEPTED:
By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Field Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Receipt Acknowledged by Contractor: _____ **Date:** _____

Copy to Owner

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STATE OF NORTH CAROLINA

AFFIDAVIT

UNION COUNTY

NOW COMES Affiant, first being sworn, deposes and says as follows:

1. I, being duly authorized by and on behalf of ("Contractor"), have entered into an agreement with Union County, North Carolina ("Union") for the West Fork Twelve-Mile Creek Interceptor project.

2. As part of my duties and responsibilities pursuant to said agreement, I attest that I am aware of and in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

___ After hiring an employee to work in the United States I verify the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or

___ I employ fewer than twenty-five (25) employees in the State of North Carolina.

3. As part of my duties and responsibilities pursuant to said agreement, I attest that to the best of my knowledge any subcontractors employed as a part of this agreement are in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

___ After hiring an employee to work in the United States the subcontractor verifies the work authorization of said employee through E-Verify and retains the record of the verification of work authorization while the employee is employed and for one year thereafter; or

___ The subcontractor employs fewer than twenty-five (25) employees in the State of North Carolina. Specify subcontractor: _____

This the ___ day of _____, 2015.

Affiant

Printed Name

Sworn to and subscribed before me, this the ___ day of _____, 2015.

[OFFICIAL SEAL]

_____, Notary Public

My Commission Expires: _____

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SECTION 01005

GENERAL REQUIREMENTS

PART 1 -- GENERAL

1.01 SCOPE AND INTENT

A. Description

The Contractor shall construct the work as shown on the Drawings and as specified and provide equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time.

The summary of the work is presented in Section 01010.

B. Work Included

The Contractor shall furnish all labor, superintendence, materials, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the Work. Contractor shall obtain and pay for all required permits not already obtained by Owner. Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.

The cost of incidental work necessary to complete the Work shall be considered as part of the cost of doing the Work and shall be included in the lump sum and/or unit bid prices.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installations and Structures

For related requirements, refer to Section 01530 and Section 02604.

D. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity,

telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried utility installation or structure shall be made only in such locations and as approved by the utility or owner thereof. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

- E. It shall be the Contractor's responsibility to contact the Owner and other utility companies and call "NC ONE-CALL" at 1-800-632-4949 or at 811, a minimum of one (1) week in advance of starting construction so maintenance personnel can locate and protect facilities, if required by the utility company.

1.02 ABBREVIATIONS AND REFERENCES

- A. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard code, specification or tentative specification adopted and published at the date of advertisement for bids, even though reference has been made to an earlier standard. The following list of specifications is hereby made a part of the Contract the same as if herein repeated in full. In the event of any conflict between any of these specifications, standards, codes, or tentative specifications and the Specifications, or in the event that one of the following conflict with another, the decision as to which shall govern will be decided by the Engineer whose judgment will be final.
- B. Reference to a technical society, organization, or body may be made in the Specifications by abbreviations, in accordance with the following list:

AASHTO -	The American Association of State Highway and Transportation Officials
ACI -	American Concrete Institute
ACIFS -	American Cast Iron Flange Standards
AFBMA -	AntiFriction Bearing Manufacturer's Association
AGA -	American Gas Association
AGMA -	American Gear Manufacturers Association
AIA -	American Institute of Architects
AISC -	American Institute of Steel Constructors
AISI -	American Iron and Steel Institute
ANSI -	American National Standards Institute
API -	American Petroleum Institute
ASCE -	American Society of Civil Engineers
ASHRAE -	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME -	American Society of Mechanical Engineers
ASTM -	American Society of Testing Materials
AWPA -	American Wood Preservers Association
AWS -	American Welding Society
AWWA -	American Water Works Association

CEMA -	Conveyor Equipment Manufacturer's Association
CDOT -	Charlotte (City of) Department of Transportation
CIPRA -	Cast Iron Pipe Research Association
CLTWater -	Charlotte Water
CRSI -	Concrete Reinforcing Steel Institute
DIPRA -	Ductile Iron Pipe Research Association
DOT -	Department of Transportation
FED.SPEC -	Federal Specifications
IEEE -	Institute of Electrical and Electronic Engineers
IPCEA -	Insulated Power Cable Engineers Association
ISO -	Insurance Services Offices
NBS -	National Bureau of Standards
NCDEQ -	North Carolina Department of Environmental Quality
NCDOT -	North Carolina Department of Transportation
NCPI -	National Clay Pipe Institute
NEMA -	National Electrical Manufacturers Association
NFPA -	National Fire Protection Association
NAVY SPEC. -	Navy Department Specification
NEC -	National Electric Code
NLMA -	National Lumber Manufacturers Association
OSHA -	Occupational Health and Safety Act
PCI -	Precast Concrete Institute
SAE -	Society of Automotive Engineers Standards
SBCC -	Standard Building Code Congress International, Inc.
SHBI -	Steel Heating Boiler Institute
SSPC -	Steel Structures Painting Council
TCA -	Tile Council of America Inc.
U.L. -	Underwriter's Laboratories, Inc.
USGS -	United States Geological Survey

When no reference is made to a code, standard, or specification, the standard specifications of the ASTM, the ANSI, the ASME, the IEEE, or the NEMA shall govern.

1.03 ACCESS TO CONSTRUCTION SITE

A. Access Roads

1. The General Contractor shall construct and maintain such temporary access roads as required to perform the work of this Contract.
2. The Contractor shall obtain and pay all cost associated with any bonds required by the N.C. Department of Transportation for the use of State maintained roads.
3. Additional access locations to the project are included in the Contract Documents. These include access points along existing sanitary sewer easements, off of City/County and state roadways, along power line rights-of-way, and other locations.
4. Should Contractor elect to access the project site from locations other than those indicated on the drawings, he must obtain written permission from the property owner and restore said access fully to pre-construction conditions. Copies of all agreements shall be provided to the Engineer upon signing. Additional disturbed

area not shown on the drawings may require additional erosion control measures, resubmittal of erosion control plan and additional fees to NCDEQ Division of Energy, Mineral and Land Resources (DEMLR) for additional disturbed area. These costs shall be at no additional cost to the Owner.

B. Parking Areas

1. Contractor shall make their own arrangements for parking. The Temporary Construction Entrances and permanent easements are the only places where the Contractor shall have access. Contractor shall construct and maintain suitable parking areas for his construction personnel along the project site and on the temporary easements as shown on the Drawings and where approved by the Engineer and the Owner. Contractor shall not park vehicles in the travel lane of any state roadway and no parking shall be permitted on the shoulder of any controlled access roadway. Contractor shall make his own arrangements for parking at his own expense. Contractor shall not block driveways or ingress/egress to residences or businesses.

C. Restoration

1. At the completion of the work, the surfaces of land used for access roads, staging operations, and parking areas shall be restored by the Contractor as indicated on the plans and in the specifications, and to the satisfaction of the Engineer. At a minimum, such restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas. Due to the nature of this project and erosion control requirements, interim restoration and stabilization will be required periodically in accordance with the progress of the project and with the access needs of the parties.

D. Traffic Regulations

1. Contractor shall obey all traffic laws and comply with all the encroachments, requirements, rules and regulations of Union County, North Carolina DOT, and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways. Contractor shall obey Owner rules and requirements for access areas within the treatment plant.

E. Material and Equipment Delivery

1. All shipments for this project must be clearly marked "Care of (Name of Contractor)", but NOT UNION COUNTY (OWNER), and delivered to the Contractor, storage yard, or project site. Shipments improperly marked and delivered to Union County (OWNER) will be rejected (refused). No materials shall be stored in NCDOT rights-of-way without written permission.

F. Storage of Equipment and Materials

1. Contractor shall store his equipment and materials at the job site or at an off-site staging location in accordance with the requirements of the General Conditions, the Supplemental Conditions, Special Provisions, and as hereinafter specified.

All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. Where space or strip heaters/cooling equipment are required within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters/cooling equipment with temperature control as necessary until the equipment is installed and being operated according to its intended use. This provision applies to other temperature and/or light sensitive materials or equipment such as paints and sealants.

2. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and security requirements, and smoking areas.
3. Contractor shall not store materials or encroach upon private property without the prior written consent of the owners of such private property. Contractor shall furnish Union County with copies of any such agreements.
4. Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.
5. Materials shall not be placed within fifty (50) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times. Detention pond outlets and basin outlets shall be protected and cleaned out immediately upon disturbance.
6. Contractor shall provide adequate temporary storage buildings/facilities, to protect materials and equipment on the job site. Contractor shall be responsible for security of his own equipment and materials. Contractor shall take every necessary and reasonable effort to protect the public.
7. Contractor is strongly encouraged to recycle construction waste. The Contractor may provide dumpsters on the job site but they should be periodically dumped out and maintained by the Contractor.
8. Fuel and any other potential contaminants shall be stored properly including containment areas and proper signage. Wash out areas for concrete trucks shall be provided.
9. No concrete truck washout shall be permitted to enter storm inlets or watercourses.

1.04 MISCELLANEOUS

A. Use of Chemicals

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show NSF approval for items to be in contact with water being treated or stored. Other items

shall have approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with the manufacturer's instructions and EPA requirements.

- B. The Contractor shall submit to the Owner the Material Safety Data Sheets for all substances or mixture of substances used on the Project prior to commencing with the work.
- C. The Contractor is advised that most of the Project is in the floodplain. The Contractor shall take appropriate precautions in the performance of the Work and in the storage of materials.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01010

SUMMARY OF WORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Work to be done under this Contract and in accordance with these Specifications consists of furnishing all equipment, superintendence, labor, skill, material, tools and all other items necessary for the complete and satisfactory construction of the Project.

The Contractor shall perform all Work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

- B. The project consists of a Single Prime Unit Price Contract for installation of approximately 26,000 LF of new sanitary sewer pipe ranging in the size from 8 to 24-inches in diameter, manholes, roadway bores, stream crossings, sedimentation and erosion control measures, and restoration of surfaces.
- C. The foregoing descriptions shall not be construed as a complete description of all Work required.

1.02 CONTRACT DOCUMENTS

- A. The Work to be performed is shown on the set of Drawings entitled "West Fork Twelve-Mile Creek Interceptor". The numbers and titles of all Drawings appear on the index sheet of Drawings. All drawings so entitled shall be considered an integral part of the Contract Documents as defined herein.
- B. Certain Document Sections refer to Divisions of the Contract Specifications. Sections are each individually numbered portions of the Specifications. The term Division is used as a convenience term meaning all Sections within a numerical grouping.

1.03 GENERAL ARRANGEMENT

- A. Drawings indicate the extent and general arrangement of the Work. If any departures from the Drawings are deemed necessary by the Contractor to accommodate the materials and equipment he proposes to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer. Approved changes shall be made without additional cost to the Owner for this work or related work under other Contracts of the Project.
- B. The specific equipment proposed for use by the Contractor on the project may require changes, in structures, tie-ins, piping, or other work to provide a complete satisfactory operating installation. The Contractor shall submit to the Engineer, for approval, all necessary Drawings and details showing such changes to verify conformance with the

overall project requirements. The Bid Price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed equipment, including increases in the costs of other Contracts.

1.04 CONSTRUCTION PERMITS, EASEMENTS AND ENCROACHMENTS

- A. The Owner shall obtain or cause to be obtained all permanent and temporary construction easements as shown on the Drawings. The Owner shall further obtain or cause to be obtained a right-of-way encroachment agreement from North Carolina Department of Transportation (NCDOT), or other relevant entities. The Contractor shall verify that these agreements have been obtained and shall comply with the conditions set forth in each agreement. Permits and Agreements are included in Appendix A and detail the Contractor's obligations for compliance.
- B. The Contractor shall obtain, keep current and pay all fees for any necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor's operations unless otherwise stated. Record copies of all permits shall be furnished to the Owner/Engineer.
- C. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this Project.
- D. The Contractor shall provide any required Performance and Indemnity Bond(s) and any additional specific insurance coverage required of the Owner by the Encroachment Agreement(s) in accordance with the Encroachment Agreement(s) between the Owner and the North Carolina Department of Transportation - Division of Highways. The Contractor shall fully comply with all of the requirements of the Owner included in the Encroachment Agreement(s).
- E. The Contractor shall confine his construction operations within the limits of public rights-of-way or easements shown on the Drawings. Storage of equipment and materials, or erection of erection and use of sheds or trailers outside these limits, if such areas are property of the Owner, shall be used only with the Owner's approval. Storage of materials or equipment on private property outside the designated easements will not be permitted unless the Contractor secures written approval from the property owner. This agreement shall clearly define the terms and conditions of the approval including any rents or payments as requested by the property owner. Copies of these agreements shall be provided to the Owner/Engineer if requested.

1.05 ADDITIONAL ENGINEERING SERVICES

- A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment which are not "or equal" by the Contractor, or changes by the Contractor in dimension, weight, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

- B. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

1.06 ADDITIONAL OWNER'S EXPENSES

- A. Charges assessed to the Contractor for additional engineering and construction observation costs will be determined based on actual hours charged to the job by the Engineer. Daily rates will depend on the number and classifications of employees involved, but in no case shall such charges exceed \$1,000 per day for Owner's personnel and \$1,500 per day for engineering personnel based on an eight (8) hour workday.
- B. Charges for additional Owner's expenses shall be in addition to any liquidated damages assessed in accordance with the Contract.

1.07 TIME OF WORK

- A. The normal time of work for this Contract is limited to 50 hours per week and shall generally be between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday. The Contractor may elect to work beyond these hours or on weekends provided that he obtains Owner/Engineer's approval a minimum of 48 hours in advance. All costs incurred by the Owner for additional construction observation beyond a 50 hour work week shall be borne by the Contractor. Additional engineering costs shall include observation services performed by the Construction Observer (hourly rate of \$105) and associated mileage (75 miles per trip at \$0.60 per mile).
 - 1. The Owner shall deduct the cost of additional engineering costs from monies due the Contractor.
- B. If it shall become imperative to perform work at night, the Owner and Engineer shall be informed a reasonable time (minimum 48 hours) in advance of the beginning of such work. Temporary lighting and all other necessary facilities for performing and inspecting the work shall be provided and maintained by the Contractor. Depending on the nature of the Work, a preconstruction meeting shall be held to confirm construction sequence and emergency planning.
- C. A written request by the Contractor must be submitted to the Owner or Engineer to work Sundays or legal holidays. Legal holidays are considered to be the following: New Year's Day, Martin Luther King, Jr.'s Birthday, Good Friday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Day after Thanksgiving, Christmas Eve, Christmas Day, and Day after Christmas. On holidays which occur on a weekend and where the Union County observes such a holiday on Friday or Monday, the Contractor will not be allowed to work on the weekend (Saturday and Sunday), or on the observed holiday. Work on weekends or legal holidays shall only be permitted with prior written acceptance of the Owner. Written acceptance to work weekends or legal holidays may be revoked at any time by the Owner or Engineer if the Contractor fails to maintain adequate equipment and supervision for the proper prosecution and quality control of the work.

- D. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during extremely hot, cool, inclement, stormy or freezing weather for good quality control. Only such work as will not suffer injury to workmanship or materials will be permitted. Contractor shall carefully protect his work against damage or injury from the weather, and when work is permitted during weather, he shall provide and maintain approved facilities for protecting the work.

1.08 EMERGENCY WORK

The Contractor agrees to provide emergency contracting services as needed to assist Union County in restoring and/or maintaining water and sewer service to the public during declared emergency situations.

The activation of this provision of the contract is at the sole discretion of the County as a result of an emergency situation that requires resources beyond that which Union County is capable of providing.

All other terms and conditions of the contract shall apply to this provision unless otherwise noted. Under no circumstances will this provision be construed to relieve the parties of such obligations as they may have under this contract to protect, maintain, replace, restore, repair and/or insure the work performed pursuant to this contract from the conditions giving rise to any emergency condition.

The type of work required during an emergency situation will vary and cannot be accurately described or detailed; however the general nature of the work shall be related to water treatment plants, wastewater treatment plants, pipelines, sewage lift stations, water booster pump stations, and all other infrastructure related to the distribution of water and the collection of wastewater.

The work shall be typical of the nature of the work the Contractor normally performs, and will not require the Contractor to perform work that is beyond the capabilities of the Contractor.

The Contractor shall perform work as directed by the Engineer or authorized County representative. The Engineer shall determine specifics of the work the Contractor shall perform, as the situation requires. The services provided by the Contractor under this provision shall be limited to that which is essential to providing water and sewer service to the public and protecting the environment. The County shall make the final determination of such services.

The Contractor shall be available for emergency work during the duration of this contract. If the Contractor believes that any services provided under this provision have or will prevent the Contractor from completing the work in a timely manner as required by this contract, the Contractor may submit a request in writing for a time extension in accordance with the provisions of this Contract.

Payment to the Contractor for services performed under this provision shall be in the form of a change order. Work performed that is substantially similar to the work required by this Contract shall be at the rate(s) established herein. Work performed that is substantially differed from the work required by this contract shall be at prevailing industry rates during times of non-emergency.

1.9 SUBSURFACE DATA

- A. Subsurface data and as-built record drawings, when included as part of contract, are offered in good faith solely for placing the Bidder in receipt of all information available to the Owner and Engineer and in no event is to be considered as part of the Contract Documents.
- B. The Bidder must interpret such subsurface data according to his own judgment and acknowledge that he is not relying upon the same as accurately describing the subsurface conditions, which may be found to exist.
 - 1. The test boring logs present factual information of the subsurface conditions at the specific test boring location only. The Bidder should not consider, or conclude, that the subsurface conditions will be consistent between test boring locations.
- C. The Bidder further acknowledges that he assumes all risks contingent upon the nature of the sub-surface conditions to be actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the Bidder performing more or less work than he originally anticipated.
- D. The Bidder is further advised that the Owner has made subsurface investigations and a report has been prepared in connection with this project for the Engineer. A copy is appended to the end of this Section.
- E. In making this data available, the Owner makes no guarantee, either expressed or implied, as to their accuracy or to the accuracy of any interpretation thereof of the subsurface data and as-built record drawings.

1.10 FIRE PROTECTION

- A. Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur. Burning will not be permitted.
- B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, and the Owner of such tank or device. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

1.11 CHEMICALS

- A. All chemicals used during project construction or furnished for project operation must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations. Any spills of chemicals shall be promptly reported to the Engineer and Owner.
- B. Storage of chemicals shall be outside of the floodplain and in a secure location.

1.12 FIRST AID FACILITIES, ACCIDENTS AND SAFETY AND HEALTH

A. First Aid Facilities

1. The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of his personnel who may be injured in connection with the work.

B. Accidents

1. The Contractor shall promptly report, in writing, to the Engineer and Owner all accidents whatsoever out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.
2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Owner and the Engineer.
3. If any claim is made by anyone against the Contractor or a Subcontractor on account of any accidents, the Contractor shall promptly report the facts, in writing, to the Engineer and Owner, giving full details of the claim.

C. Safety and Health

1. The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (P.L. 91-596) and under Section 107 of the Contractor Work Hours and Safety Standards Act (P.L. 91-54).

1.13 CONTRACTOR'S SAFETY REPRESENTATIVE

The Contractor shall be required to designate a qualified and experienced safety representative for the jobsite. This individual will be responsible for explaining compliance requirements to the Contractor's employees, maintaining and supervising safety precautions and programs, conducting weekly safety inspections of the jobsite and providing a copy of the report to the County.

The Contractor shall at all times perform the work subject to this Contract in a safe and proper manner and in compliance with all applicable ordinances, statutes, rules and regulations concerning safety, including but not limited to, such applicable statutes, rules and regulations known as or issued pursuant to, the Occupational Safety and Health Act (OSHA) (hereinafter "safety standards"). Without limiting the foregoing in any manner, safety standards concerning trenching and excavation are particularly important. If the Engineer or his authorized Inspector(s) become aware of any violation of the safety standards or of any failure by the Contractor to comply with the safety standards, the Engineer and his authorized Inspector(s) may, but shall not be obligated to, report such violation to the regulatory agency. It is expressly understood and agreed that neither the Engineer, County, its officers, employees or representatives have any obligation, duty or responsibility to inspect the work subject to this contract for compliance with this sub-paragraph nor to report violations of this sub-paragraph to the Contractor and/or any regulatory agency.

The Contractor's safety representative shall notify the Owner's Safety Officer any upcoming safety meetings so he can attend. The Contractor will notify the County's designated representative within 2 hours of any serious accident or injury and within 1 hour of any fatality.

The Contractor will immediately notify the Owner's Safety Officer and the Engineer of any OSHA inspection. In addition, the Contractor will send the Owner a copy of any citation(s) upon receipt of the citation (not after settlement of the case).

The Contractor will notify the Safety Officer of any unusual hazards created by the job or found during construction.

The Contractor will provide to the Owner a copy of all work permits, if requested. Permits issued will include confined space entry, lockout/tagout, blasting, excavations, etc.

The Contractor shall provide a copy of a written safety program to meet the needs of the job (i.e., hazard communication, excavation, trenching, confined space, etc.). In addition, the Contractor will provide:

- a copy of their drug and alcohol abuse program,
- fire protection and emergency evacuation plan,
- medical services regarding worker's compensation medical services and first aid on the job site,
- personal protective equipment (PPE) - determine personal protective equipment needs and documentation of PPE assessment. The Contractor shall maintain good housekeeping (i.e., clean work areas, clear access, barricade dangerous areas).

1.14 PROJECT MANAGEMENT AND SUPERVISION

The Contractor shall provide a project manager, project superintendent, and foreman (one foreman for each operating crew) to manage and supervise the project. The project superintendent shall be on the site from the beginning of work in the field and shall remain on the site full time until final acceptance of all work. Payment for all project management and supervision shall be a mandatory subsidiary obligation under the Contract, and no separate payment will be made by the Owner. No waivers of this requirement shall be permitted. The minimum experience of the project management and supervision team is as follows:

Project Manager: The project manager shall have a minimum of 10 years of experience in managing construction work of this type and magnitude supported by a resume and project references. The project shall serve as main point of contact for Engineer and Owner with authority to act on behalf of the Contractor.

Project Superintendent: The Contractor shall provide a full-time, onsite project superintendent. The project superintendent shall be fully experienced in supervising construction work of this type and magnitude with a minimum of 10 years of experience supported by a resume and project references. The project superintendent shall serve as main contact point for the Engineer's onsite representative.

The Owner reserves the right to reject the Contractor's project manager or project superintendent for failure to meet the minimum experience requirements or for failure to provide a resume and references supporting applicable experience.

The project manager and project superintendent shall not be the same person. Failure of the Contractor's project manager or project superintendent to work with the Engineer and Owner in good faith shall result in removal of the project manager and/or superintendent from the job and replacement with a suitable project manager and/or superintendent meeting the requirements specified herein.

1.15 ULTIMATE DISPOSITION OF CLAIMS BY ONE CONTRACTOR ARISING FROM ALLEGED DAMAGE BY ANOTHER CONTRACTOR

- A. During the progress of the work, other Contractors may be engaged in performing other work or may be awarded other Contracts for additional work on this project. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors and the Contractor shall fully cooperate with such other Contractors and carefully fit its own work to that provided under other Contracts. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.
- B. If the Engineer shall determine that the Contractor is failing to coordinate his work with the work of the other Contractors, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Contractor completely remedies.
- C. If the Contractor notifies the Engineer in writing that another Contractor is failing to coordinate his work with the work of this Contract, the Engineer will promptly investigate the charge. If the Engineer finds it to be true, he will promptly provide such information to the other Contractor with respect thereto as the situation may require. The Owner, the Engineer, nor any of their agents shall not, however, be liable for any damages suffered by the Contractor by reason of the other Contractor's failure to promptly comply with the directions so issued by the Engineer, or by reason of another Contractor's default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any Contractor.
- D. The Contractor shall indemnify and hold the Owner and the Engineer harmless from any and all claims of judgments for damages and from costs and expenses to which the Owner may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with the Engineer's directions promptly.
- E. Should the Contractor sustain any damage through any act or omission of any other Contractor having a Contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a Subcontractor of such Contract, the Contractor shall have no claim against the Owner or the Engineer for such damage, but shall have a right to recover such damage from the other Contractor under the provision similar to the following provisions which have been or will be inserted in the Contracts with such other Contractors.
- F. Should any other Contractor having or who shall hereafter have a Contract with the Owner for the performance of work upon the site sustain any damage through any act or omission

of the Contractor hereunder or through any act or omission of any Subcontractor of the Contractor, the Contractor agrees to reimburse such other Contractor for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the Owner harmless from all such claims.

- G. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, by its recourse to assessment of liquidated damages as provided in the Contract, or by the exercise of any other remedy provided for by Contract Documents or by law.

1.16 BLASTING AND EXPLOSIVES

- A. When blasting is utilized at the site of the work, the Contractor shall take all precautions and provide all protective measures to prevent damage to property and structures or injury to persons. Prior to blasting, the Contractor shall secure all permits required by law for blasting operations and shall provide any additional hazard insurance required by the Owner. The Contractor shall have a fully qualified and experienced blasting foreman in charge of all blasting operations. The Contractor shall undertake the complete drilling and blasting operations, including handling and storing of explosives, in accordance with Federal, State, and Local laws and regulations and in conformance with the recommendations and practices of the Institute of Makers of Explosives. No blasting shall commence without prior notification being given the Owner, Engineer, police and fire departments. Blasting shall be covered or otherwise satisfactorily confined. Contractor shall be responsible for and shall bear the expense of any damage of whatever nature caused by blasting or accidental explosions. All blasting must be witnessed and third party monitored as contracted by the Contractor. Contractor shall notify Engineer/Owner at least 30-days in advance of any blasting operations. Refer to Section 02202 Excavation By Blasting. All blasting beneath NCDOT and City/County roadways shall be controlled to minimize risk of damage to existing pavements, whether open cut or in a bored crossing. Contractor shall be responsible for pavement upheaval and any damage due to their blasting operations. Any damage shall be corrected immediately at no additional cost to the Owner.

1.17 LIMITS OF WORK AREA

- A. The Contractor shall confine his construction operations within the Contract limits shown on the Drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the Contract limits, if such areas are the property of the Owner, shall be used only with the Owner's approval. Such storage or temporary structures, even within the Contract's limits, shall be confined to the Owner's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

1.18 WEATHER CONDITIONS

- A. No work shall be done when the weather is unsuitable. The Contractor shall take necessary precautions (in the event of impending storms) to protect all work, materials, or equipment from damage or deterioration due to floods, heat waves, driving rain, or wind, and snow storms. The Owner reserves the right, through the opinion of the Engineer, to order that

additional protection measures over and beyond those proposed by the Contractor, be taken to safeguard all components of the Project. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the Owner for damage to the work from weather elements.

- B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains shall be stopped during rainstorms; and all freshly placed work shall be protected by suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete, or laying of masonry, in cold weather shall be as described elsewhere in these Specifications.

1.19 USE OF FACILITIES BEFORE COMPLETION

- A. The Owner reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only those portions of the facilities which have been completed to the Engineer's and Owner's satisfaction in accordance with the specs herein shall be placed in service. The Engineer may issue a Certificate of Substantial Completion covering that part of the work being placed into service.

1.20 CONSTRUCTION VIDEO

- A. The Contractor shall video the entire project site including all concrete and asphalt pavements, curb and gutter, fencing to remain, structures to be demolished, nearby critical structures such as retaining walls and bridge abutments, and existing structures that are to be modified. The original videotape shall be turned over to the Engineer prior to beginning construction activities. The video shall be DVD format. The video shall clearly identify existing site and structural conditions prior to construction.

1.21 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations.
- B. Maintain and/or restore to their original condition, pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with sod and shrubs, in yards and parking areas, whether within or outside the easement.
- C. Use new materials for replacement of all items.
- D. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, streams and streambanks, culverts, bridges, and other public or private property, regardless of location or character, that may be caused by the Contractor and/or his subcontractors, for any reason, including by transporting equipment, materials, or workers to or from the Work or any part or site thereof.

- E. Make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, any damaged property concerning its repair, replacement, or payment of costs incurred in connection with the damage.
- F. In areas where the Contractor's operations are adjacent to or near a utility and such operations may cause damage which might result in considerable expense, loss, and inconvenience, the operation shall be suspended until all arrangements necessary for the protection thereof have been made by the Contractor.
- G. Notify all utility offices which may be affected by the construction operation at least 72 hours in advance. Before exposing any utility, the utility having jurisdiction shall grant permission and may oversee the operation. Should service of any utility be interrupted due to the Contractor's operation, the proper authority shall be notified immediately. Contractor shall cooperate with the said authority in restoring the service as promptly as possible and shall bear any costs incurred.

1.22 EASEMENTS AND RIGHTS-OF-WAY

- A. Confine construction operations to the immediate vicinity of the location indicated on Drawings and use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause the least possible damage to property and interference with traffic.

1.23 REGULATORY REQUIREMENTS

- A. Comply with all Federal, State, and local laws, regulations, codes, and ordinances applicable to the Work.

1.24 ACCESS BY GOVERNMENT OFFICIALS

- A. Authorized representatives of governmental agencies shall at all times have access to the Work where it is in preparation or progress. Contractor shall provide proper facilities for access and inspection.

1.25 CIVIL PENALTIES AND COSTS

- A. No sanitary sewer overflows, spills, or discharge of raw wastewater shall be allowed. The Contractor shall pay all civil penalties, costs, assessments, etc. associated with any overflow, spill, or discharge of raw wastewater associated with the Contractor's work. In the event an overflow, spill, or discharge of raw wastewater occurs, the Contractor shall notify the Owner/Engineer immediately.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -



Report of Subsurface Exploration
West Fork Twelve Mile Creek Interceptor
Union County, North Carolina
S&ME Project No. 1335-17-037

PREPARED FOR:

Hazen and Sawyer
9101 Southern Pine Boulevard, Suite 250
Charlotte, North Carolina 28273

PREPARED BY:

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, NC 28273

January 16, 2018



January 16, 2018

Hazen and Sawyer
9101 Southern Pine Boulevard, Suite 250
Charlotte, North Carolina 28273

Attention: Mr. Jeff Greene

Reference: **Report of Subsurface Exploration**
West Fork Twelve Mile Creek Interceptor
Union County, North Carolina
S&ME Project No. 1335-17-037
NC PE Firm License No. F-0176

Dear Mr. Greene:

S&ME, Inc. (S&ME) has completed the subsurface exploration for the above-referenced project. This exploration was performed in general accordance with the *Subcontract Agreement for Professional Services between Hazen & Sawyer and S&ME, Inc. for West Fork Twelve Mile Creek Interceptor* dated July 7, 2017.

The purpose of the exploration was to determine the subsurface conditions at the site and to evaluate those conditions with regard to the utility installation. This report presents our findings together with our conclusions and recommendations.

S&ME appreciates the opportunity to assist you during this phase of the project. If you should have any questions concerning this report or if we may be of further assistance, please contact us.

Sincerely,

S&ME, Inc.

A handwritten signature in black ink that reads "Nate R. Bradley".

Nate R. Bradley, E.I.T.
Staff Professional

Kristen H. Hill, P.E., P.G.
Principal Geotechnical Engineer
Registration No. 29147



Table of Contents

1.0	Introduction	1
1.1	Project and Site Description	1
1.2	Purpose and Scope	1
2.0	Exploration Procedures	2
2.1	Soil Test Borings	2
2.2	Rod Soundings.....	2
2.3	Laboratory Testing	3
3.0	Area Geology and Subsurface Conditions	3
3.1	Physiography and Area Geology	3
3.2	Subsurface Conditions	5
3.2.1	<i>Antioch Church Road (Borings B-1 and B-2)</i>	<i>5</i>
3.2.2	<i>Beulah Church Road (Borings B-3 and B-4).....</i>	<i>6</i>
3.2.3	<i>Forest Lawn Drive (Borings B-5 and B-6).....</i>	<i>7</i>
3.2.4	<i>Rod Soundings</i>	<i>7</i>
3.3	Laboratory Summary	8
4.0	Conclusions and Recommendations	9
4.1	General.....	9
4.2	Design and Installation Considerations	9
4.2.1	<i>Rock and Partially Weathered Rock</i>	<i>9</i>
4.2.2	<i>Groundwater</i>	<i>9</i>
4.2.3	<i>Existing Fill and Alluvial Soils.....</i>	<i>10</i>
4.2.4	<i>Uplift Forces.....</i>	<i>10</i>
4.3	Pipe Bedding	10
4.4	Untrenched Pipe Recommendations	11
4.4.1	<i>General</i>	<i>11</i>
4.4.2	<i>Design and Installation Considerations.....</i>	<i>11</i>
4.4.3	<i>Boring and Receiving Pits.....</i>	<i>12</i>



4.5	Earthwork Considerations	13
4.5.1	Existing Underground Utilities.....	13
4.5.2	Site Preparation.....	13
4.5.3	Temporary Dewatering.....	13
4.5.4	Temporary Excavation Stability	14
4.5.5	Fill Material and Placement.....	14
5.0	Limitations of Report	15

List of Figures

Figure 3-1: Physiographic Provinces of North Carolina.....	4
Figure 3-2: Typical Piedmont Weathering Profiles (After Sowers/Richardson, 1983)	5

List of Tables

Table 3-1: Rod Sounding Summary.....	8
Table 3-2: Laboratory Testing Results.....	8
Table 4-1: Untrenched Pipe Installation Pit Design Parameters.....	12

Appendix

- Site Vicinity Plan, Figure 1
- Test Location Plans, Figures 2 through 8
- Generalized Subsurface Profiles, Figures A through C
- Road Crossings, Figures D through F
- Legend to Soil Classification and Symbols
- Boring Logs
- Rock Core Photo Log
- Rod Sounding Logs
- Results of Laboratory Testing



1.0 Introduction

1.1 Project and Site Description

Project information is based on telephone calls, email correspondence, and project team meetings between Jeff Greene of Hazen and Sawyer (Hazen) and Kristen Hill of S&ME between June 2017 and January 2018. Project information, including a CAD file of the proposed horizontal alignment and a pdf of 6 requested boring locations, was relayed through email. 50% design documents were provided in pdf format via email on December 18, 2017. Updated versions of the proposed horizontal alignment and 50% design documents were provided via email on January 9, 2018.

We understand that Hazen is in the design phase for construction of a new 24-inch diameter interceptor that generally parallels West Fork Twelve Mile Creek in Union County, North Carolina. The new interceptor will run from the existing Brookhaven Pump Station to an existing 24-inch interceptor located just north of Weddington Road (Highway 84). Additionally, a new 8-inch diameter sanitary sewer will connect the existing Scotch Meadows Pump Station to the new interceptor. The approximate project alignment is identified in the Site Vicinity Plan (Figure 1) in the Appendix. Based on the provided 50% design documents, the new interceptor will be installed via cut and cover for the majority of the approximate 24,000 foot alignment, with installation via jack and bore techniques at the following major road crossings:

- Antioch Church Road
- Beulah Church Road
- Forest Lawn Drive

Hazen & Sawyer requested S&ME provide geotechnical borings for the major road crossings, as well as rod sounding data at approximate 2,000 foot intervals along the alignment to estimate depth to rock.

1.2 Purpose and Scope

The purpose of this geotechnical study was to explore the subsurface conditions at/along portions of the sewer alignment and develop geotechnical recommendations for the design and construction of the project.

S&ME has completed the following scope of geotechnical services for this project:

- Visited the site to mark the boring locations.
- Contacted North Carolina 811 to mark underground utilities.
- Subcontracted a traffic control company to provide temporary lane closures.
- Mobilized a drill rig and crew to the site.
- Performed six (6) soil test borings at the site.
- Cored rock within one (1) of the borings.
- Attempted water level measurements in the borings.
- Backfilled the boreholes with soil cuttings, installed a hole closure device near the ground surface in each borehole, and backfilled with soil cuttings to the ground surface.



- Patched borings in roadways with cold-mix asphalt patch.
- Performed 13 rod soundings at approximate 2,000 foot intervals along the proposed alignment.
- Performed laboratory testing.
- Prepared this geotechnical engineering report summarizing our testing procedures, describing the subsurface conditions at the site, and providing geotechnical conclusions and recommendations.

2.0 Exploration Procedures

2.1 Soil Test Borings

In order to explore the general subsurface conditions at the project site, six (6) soil test borings (B-1 through B-6) were drilled to depths ranging from approximately 12.8 to 29.6 feet below existing grades. The borings were advanced at the approximate locations shown on the Test Location Plan sheets (Figures 2 through 8) in the Appendix. The approximate boring locations were selected by Hazen and were located in the field by an S&ME staff professional using a handheld GPS. The northings and eastings indicated on the soil test boring logs included in the Appendix were recorded using a handheld GPS unit. The ground surface elevations indicated on the soil test borings were obtained from the provided 50% Design documents and should be considered approximate.

Truck-mounted CME-55 and CME-45B drill rigs were used to advance the borings to auger refusal using hollow-stem augers. Standard Penetration Test (SPT) split spoon sampling was performed at designated intervals in the soil test borings in general accordance with ASTM D1586 to provide an index for estimating soil strength and relative density or consistency. SPT tests were performed with a hydraulic automatic hammer. In conjunction with the SPT testing, samples are obtained for soil classification purposes. Representative portions of each soil sample were placed in glass jars and taken to our laboratory.

Boring B-6 was extended below auger refusal depth using NQ2 coring equipment and water as coring fluid. Diamond core drilling procedures were performed in general accordance with ASTM D2113 to obtain core samples of refusal material encountered in the boring. The results of the diamond core drilling, including percent recovery and Rock Quality Designation (RQD) values, are indicated on the appropriate Boring Log in the Appendix.

Water level measurements were attempted in the borings at the termination of drilling activities. The borings were backfilled with soil cuttings, a hole closure device was installed near the ground surface, and backfilling with soil cuttings was continued to the ground surface. The surface of borings performed in roadways was patched with cold-mix asphalt patch.

2.2 Rod Soundings

Thirteen rod soundings (RS-1 through RS-13) were performed by driving a 1/2-inch diameter steel rod in 3-foot lengths with an approximately 16.5 pound pipe hammer manually to refusal. Sounding rods can be used to verify the depth to hard rock or partially weathered rock beneath soft to loose alluvium along creek channels and beneath soft to loose soils. Please note however, the blow counts and blows per foot measurements shown on



the Rod Sounding logs are not the same as those from SPT testing in the borings and should not be directly compared.

The rod soundings were advanced to depths ranging from 3.8 to 9.1 feet below the existing ground surface along the proposed alignment at approximate 2,000 foot intervals. The rod sounding locations are shown on the Test Location Plan sheets in the Appendix. The northings and eastings indicated on the rod sounding logs included in the Appendix were recorded using a handheld GPS unit. The stations indicated on the rod sounding logs should be considered approximate.

2.3 Laboratory Testing

Once the split-spoon samples arrived in our laboratory, a geotechnical staff professional visually examined each sample in general accordance with the Unified Soil Classification System (USCS) to estimate the distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams and apparent geological origin. The results of the classifications, as well as the field test results, are presented on the individual boring logs included in the Appendix. Similar materials were grouped into strata on the logs. The strata contact lines represent approximate boundaries between the soil and rock types; the actual transition between the soil and rock types in the field may be gradual in both the horizontal and vertical directions.

Representative soil samples were selected for laboratory index testing to confirm visual soil classifications and estimate the engineering properties of the tested soil. Two representative rock core samples were tested for unconfined compressive strength. The results of the laboratory testing are summarized in Section 3.3, and the complete test results are included in the Appendix.

3.0 Area Geology and Subsurface Conditions

3.1 Physiography and Area Geology

The site is located within the Charlotte Belt of the Piedmont Physiographic Province of North Carolina, as shown in Figure 3-1. The Piedmont Province generally consists of well-rounded hills and ridges, which are dissected by a well-developed system of draws and streams. The Piedmont Province is predominantly underlain by metamorphic rock (formed by heat, pressure and/or chemical action) and igneous rock (formed directly from molten material), which were initially formed during the Precambrian and Paleozoic eras. The volcanic and sedimentary rocks deposited in the Piedmont Province during the Precambrian eras were the host for the metamorphism and were changed to gneiss and schist. The more recent Paleozoic era had periods of igneous emplacement, with at least several episodes of regional metamorphism resulting in the majority of the rock types seen today.

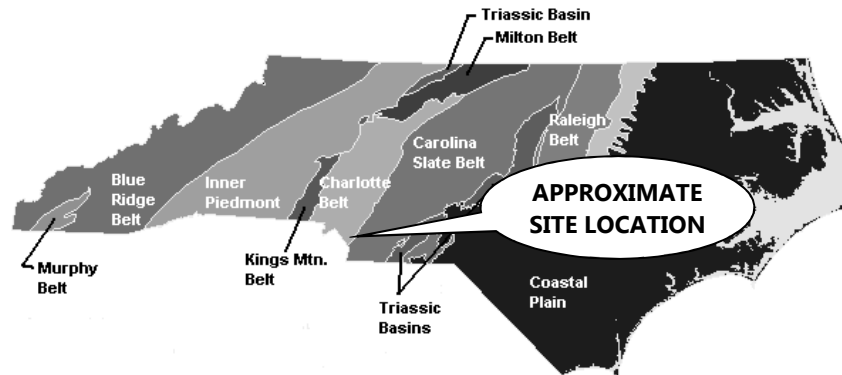


Figure 3-1: Physiographic Provinces of North Carolina

The topography and relief of the Piedmont Province have developed from differential weathering of the igneous and metamorphic rock. Because of the continued chemical and physical weathering, the rocks in the Piedmont Province are now generally covered with a mantle of soil that has weathered in place from the parent bedrock. These soils have variable thicknesses and are referred to as residuum or residual soils. The residuum is typically finer grained and has higher clay content near the surface because of the advanced weathering. Similarly, the soils typically become coarser grained with increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance, texture, gradation and foliations of the parent rock.

The boundary between soil and rock in the Piedmont is not sharply defined. A transitional zone termed “partially weathered rock” is normally found overlying the parent bedrock. Partially weathered rock (PWR) is defined for engineering purposes as residual material with Standard Penetration Resistances (N-values) exceeding 100 blows per foot (bpf). The transition between hard/dense residual soils and partially weathered rock occurs at irregular depths due to variations in degree of weathering. A graphic depiction of typical Piedmont weathering profiles is presented in Figure 3-2.

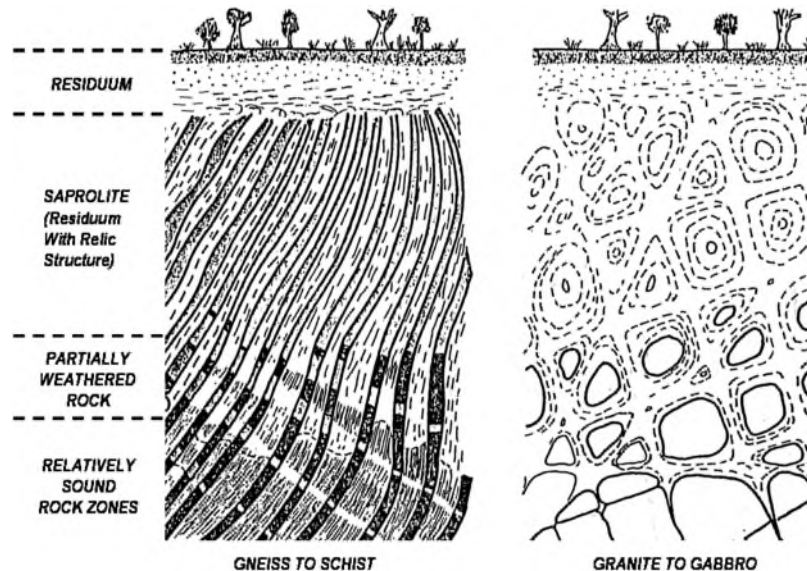


Figure 3-2: Typical Piedmont Weathering Profiles (After Sowers/Richardson, 1983)

Water is typically present in the residual soils and within fractures in the PWR or underlying bedrock in the Piedmont. On upland ridges in the Piedmont, water may or may not be present in the residual soils above the PWR and bedrock. Alluvial soils in floodplains are generally saturated to within a few feet of the ground surface. Fluctuations in water levels are typical in residual soils and PWR in the Piedmont, depending on variations in precipitation, evaporation and surface water runoff. Seasonal high water levels are expected to occur during or just after the typically wetter months of the year (November through April).

3.2 Subsurface Conditions

Subsurface conditions as indicated by the soil test borings generally consist of surficial pavement or topsoil underlain by fill soils, alluvial soils, residual soils, PWR, and crystalline rock. The generalized subsurface conditions at the site are described below. Additionally, Generalized Subsurface Profiles (Figures A through C) as well as Road Crossing drawings (Figures D through F), showing the borings on the provided plan and profile, are included in the Appendix. For more detailed soil descriptions and stratifications at a particular boring location, the respective boring log should be reviewed.

3.2.1 Antioch Church Road (Borings B-1 and B-2)

Surface: The surface material at Borings B-1 and B-2 consisted of 4 inches of asphalt over 3 inches of aggregate base course (ABC Stone).

Fill Soils: Fill soils were encountered in both borings and extended to depths of approximately 5.5 feet beneath the existing ground surface. The fill soils consisted of stiff to firm sandy silt (USCS classification ML) and soft clayey silt (MH) and exhibited SPT N-values ranging from 4 to 10 blows per foot (bpf).



Alluvial Soils: Alluvial soils were encountered in both borings beneath the fill and generally consisted of soft sandy clay (CL-ML) and loose clayey sand (SC). The alluvial soils extended to depths of approximately 8 feet and were noted as being wet. The SPT N-values of the alluvial soils ranged from 4 to 5 bpf.

Residual Soils: Residual soils were encountered underlying the alluvial soils. The residuum consisted of firm to stiff sandy clay (CL) with SPT N-values ranging from 6 to 12 bpf.

Partially Weathered Rock: PWR was encountered beneath the residuum in Boring B-2 at a depth of approximately 12 feet (approximate elevation of 555.5 feet). When sampled, the PWR generally breaks down into sandy gravel.

Auger Refusal Material: Borings B-1 and B-2 encountered auger refusal at depths of 12.8 and 13.7 feet, respectively (approximate elevations of 554.7 and 553.8 feet). Auger refusal is a relative term used to describe material that could not be penetrated by the drilling equipment used at the site. Auger refusal may be due to the presence of boulders, rock ledges, lenses, or seams, or the top of parent bedrock. Rock coring is required to confirm the type and continuity of the refusal material.

Water Levels: Groundwater was encountered in Boring B-2 at the termination of drilling at a depth of 12 feet (approximate elevation of 555.5 feet) on November 16, 2017.

Water levels tend to fluctuate with seasonal and climatic variations, as well as with some types of construction operations. Therefore, water may be encountered during construction at depths not indicated by the borings.

3.2.2 Beulah Church Road (Borings B-3 and B-4)

Surface: The surface material at Boring B-3 consisted of 6 inches of asphalt over 3 inches of ABC Stone. The surface at Boring B-4 consisted of 3 inches of topsoil.

Fill Soils: Fill soils were encountered in Borings B-3 and B-4 and extended to depths of approximately 12 and 5.5 feet, respectively, beneath the existing ground surface. The fill soils consisted of firm silty clay (CH), stiff clayey silt (MH), stiff sandy clay (CL), and firm to stiff sandy silt (ML). The fill soils exhibited SPT N-values ranging from 7 to 11 bpf.

Residual Soils: Residual soils were encountered underlying the fill soils in both borings. The residuum consisted of firm silty clay (CH), hard to very hard sandy silt (ML), and medium dense silty sand (SM), with SPT N-values ranging from 7 to 68 bpf.

Partially Weathered Rock: PWR was encountered beneath the residuum in Boring B-4 at a depth of approximately 12 feet (approximate elevation of 570 feet). When sampled, the PWR generally breaks down into sandy silt.

Auger Refusal Material: Borings B-3 and B-4 encountered auger refusal at depths of 20.5 and 15 feet, respectively (approximate elevations of 571.5 and 567 feet). Auger refusal is a relative term used to describe material that could not be penetrated by the drilling equipment used at the site. Auger refusal may be due to the



presence of boulders, rock ledges, lenses, or seams, or the top of parent bedrock. Rock coring is required to confirm the type and continuity of the refusal material.

Water Levels: Groundwater was not encountered in either of the borings at the termination of drilling, and the borings were backfilled immediately.

3.2.3 *Forest Lawn Drive (Borings B-5 and B-6)*

Surface: The surface material at Borings B-5 and B-6 consisted of 8 inches of asphalt over 3 inches of ABC Stone.

Fill Soils: Fill soils were encountered in Borings B-5 and B-6 and extended to depths of approximately 12 feet beneath the existing ground surface. The fill soils consisted of soft to stiff silty clay (CH), firm sandy clay (CL), loose to medium dense clayey sand (SC), and loose silty sand (SM). The fill soils exhibited SPT N-values ranging from 4 to 15 bpf.

Residual Soils: Residual soils were encountered underlying the fill soils in Boring B-5. The residuum consisted of stiff sandy clay (CL), exhibited an SPT N-value of 13 bpf, and was noted as being wet.

Partially Weathered Rock: PWR was encountered beneath the fill or residuum in both borings at depths of approximately 17 and 12 feet, respectively (approximate elevations of 599 and 604 feet). When sampled, the PWR generally breaks down into sandy gravel.

Auger Refusal Material and Bedrock: Borings B-5 and B-6 encountered auger refusal at depths of 21.2 and 14.2 feet, respectively (approximate elevations of 594.8 and 601.8 feet). Auger refusal is a relative term used to describe material that could not be penetrated by the drilling equipment used at the site. Auger refusal may be due to the presence of boulders, rock ledges, lenses, or seams, or the top of parent bedrock. Rock coring is required to confirm the type and continuity of the refusal material.

Boring B-6 was extended into the auger refusal material using rock coring techniques. The rock encountered at the site consisted of hard, very slightly to slightly weathered metavolcanic rock with recoveries of 100 percent and Rock Quality Designations (RQD) ranging between 0 and 90 percent. The unconfined compressive strengths of samples tested from Boring B-6 were 23,099 and 37,833 psi.

Water Levels: Groundwater was not encountered in either boring at the termination of drilling, and the borings were backfilled immediately.

3.2.4 *Rod Soundings*

Sounding rods were used to attempt to verify the depth to hard rock or weathered rock along the sewer alignment. Based on the rod soundings, the depth of refusal material ranged from 3.8 to 9.1 feet below the ground surface. The following table summarizes the rod sounding locations and depth of refusal.



Table 3-1: Rod Sounding Summary

Rod Sounding	Approximate Station	General Location	Depth of Refusal (feet)
RS-1	3+00	Near Weddington Road	8.9
RS-2	23+00	Between Weddington Road and Antioch Church Road	8
RS-3	39+75		8.7
RS-4	64+75	Between Antioch Church Road and Beulah Church Road	3.8
RS-5	86+50		9.1
RS-6	103+00	Between Beulah Church Road and Forest Lawn Drive	6
RS-7	123+00		5.7
RS-8	144+25		4.5
RS-9	164+25		7.2
RS-10	184+25		5.9
RS-11	204+25	North of Forest Lawn Drive	5.5
RS-12	223+00		6.3
RS-13	10+25	Scotch Meadows Alignment	5.8

3.3 Laboratory Summary

The results of the laboratory tests performed on the representative soil and rock core samples are presented in the following table. The complete results of each test are included in the Appendix.

Table 3-2: Laboratory Testing Results

Test Location	Sample Depth (feet)	USCS / Rock Classification	Natural Moisture Content (%)	Fines (%)	Liquid Limit	Plastic Index	Unconfined Compressive Strength (psi)
B-1	6 – 7.5'	CL-ML	23.6	84.4	25	5	-
B-3	6 – 7.5'	CH	26.9	82.9	71	47	-
B-5	13.5 – 15'	CL	17.1	53.5	31	9	-
B-6	20.0 – 20.4'	Metavolcanic Rock	-	-	-	-	37,833
B-6	26.9 – 27.3'	Metavolcanic Rock	-	-	-	-	23,099



4.0 Conclusions and Recommendations

4.1 General

Our conclusions and recommendations are based on the project information outlined previously and on the data obtained from the field-testing program. If the structural loading, geometry or proposed sewer line locations or depths are changed or significantly differ from those outlined, or if conditions are encountered during construction that differ from those encountered by the soil test borings and sounding rod tests, S&ME requests the opportunity to review our recommendations based on the new information and make any necessary changes.

4.2 Design and Installation Considerations

4.2.1 *Rock and Partially Weathered Rock*

Based on the results of the soil test borings and sounding rod tests, it appears that the general excavation for sewer lines in traditional cut and cover trenches, as well as sending and receiving pits for road crossings, will be in fill, alluvial soils, residual soils, PWR, and/or rock. Generally, the existing fill, alluvial and residual soils can be excavated using traditional equipment (e.g., scrapers, trackhoes, and front-end loaders).

PWR/weathered rock and rock/refusal material was encountered in each of the borings and rod soundings. Excavatable PWR is defined as material that can be excavated using traditional equipment by first loosening with a single tooth ripper attached to a suitable sized dozer, such as a Caterpillar D-8 or D-9, or suitable sized trackhoe such as a Caterpillar C320 equipped with a rock bucket with a curling force of 18,300 pounds or greater.

Jack hammering or blasting may be required for PWR in trench excavations, below the upper 2-4 feet of PWR in open excavations, and for rock in both open site (greater than 10 feet wide and 30 feet long) and trench excavations. We anticipate blasting will not be allowed to excavate sending and receiving pits due to the close proximity of the roadways.

Jack hammering or blasting of rock may result in an uneven rock surface in the bottom of trench excavations and a subsequent point load condition on the pipe. If dissimilar bearing conditions exist in trench excavations, we recommend that those conditions be evaluated prior to placement of the pipe. To provide a uniform bearing surface and reduce the potential for point loading, over-excavation below the bearing elevation and replacement with properly compacted low-plasticity granular soil, crushed stone, or lean concrete may be required. If dissimilar bearing conditions are encountered during excavation for the pipes, bedding should be provided in accordance with the manufacturer's recommendations for the pipe.

The depth to, and thickness of, PWR, rock lenses or seams and bedrock, can vary dramatically in short distances and between boring locations; therefore, PWR, boulders or bedrock may be encountered during any excavation on this project.

4.2.2 *Groundwater*

Much of the alignment parallels and crosses West Fork Twelve Mile Creek. The fluctuation in surface water levels in the creek will significantly affect the groundwater in nearby floodplains. Groundwater was encountered in



Boring B-2 at the time of the exploration. Also, groundwater is commonly present in highly-weathered seams, fractures and joints in the PWR and bedrock in the Charlotte area. Temporary de-watering techniques will be required during installation of the proposed pipeline, particularly in deeper excavations such as pits for untrenched installation of pipe. At the creek crossings, it is assumed that the groundwater levels will be near the water level in the creeks. In addition, uplift or buoyancy will be a factor where the pipeline will be installed below the groundwater table. Depending on the time of year construction proceeds and the depths of the proposed excavations, groundwater may be encountered during construction at levels which deviate from this report.

4.2.3 Existing Fill and Alluvial Soils

Based on the borings and soundings, the existing fill and alluvial soils range in consistency from soft to stiff silts and clays and loose to medium dense sands. Fill and alluvial soils may be encountered at the sewer line bearing elevation. These materials seemed to be fairly clean and free of deleterious materials; however, some were relatively soft and the alluvial soils were wet.

Undercutting of soft existing fill and alluvial soils encountered at the pipe bearing elevation may be required. The extent and depth of undercutting should be determined in the field prior to placement of the pipe.

Based on the visual observations of the split-spoon samples, the existing fill and alluvial soils encountered generally appear to be suitable for re-use as structural fill. The re-use and placement of the existing soils is discussed in Section 4.5.5. It should be noted that the alluvial soils are often saturated or above optimum moisture content and may require drying prior to re-use as structural fill. Further evaluation regarding the suitability for re-use could be performed during construction.

4.2.4 Uplift Forces

Uplift or buoyancy will be a factor where the pipeline will be installed below the groundwater table. If the uplift forces are approximately equal to the weight of the pipe (empty) and backfill or larger, it will be necessary to anchor the pipe. We recommend a minimum factor of safety of 1.25 be provided against uplift when utilizing dead load for resistance.

4.3 Pipe Bedding

The pipe bedding material should comply with all requirements of the pipe manufacturer. In excavations where groundwater is encountered, we recommend that adequate temporary de-watering measures be provided to help maintain stable subgrade conditions. It may be necessary, depending on the actual subsurface conditions, that the excavation bottoms and sides be lined with a needle punched non-woven filter fabric such as Mirafi 140N, or equivalent and the granular backfill wrapped in the fabric to prevent the infiltration of soil fines into the granular material which could otherwise result in the creation of voids and corresponding subsidence of these soils. The fabric should be placed in areas where the water table is encountered during construction and at designated areas, such as roadway and stream crossings where open cuts are required.



4.4 Untrenched Pipe Recommendations

4.4.1 *General*

Pipe installation at the roadway crossings will be performed using untrenched methods. The methods used by the contractor should comply with NCDOT requirements.

Jack and bore tunneling methods are generally used for untrenched pipe installation and consist of excavating a jacking pit adjacent to the proposed installation location and hydraulically pushing sections of pipe or casing along the alignment. After installation of the first section of casing, additional sections of casing are subsequently welded to the previous section of casing and advanced with the jacking system. Earth removal is generally accomplished by mechanical means such as augers or boring equipment. A receiving pit is constructed at the other end of the tunnel to receive the casing.

The casing is advanced forward using a jacking system. Horizontal forces induced by the jacking system are resisted by the jacking pit support system. It is necessary to provide a relatively uniform distribution of load around the pipe or casing periphery to prevent localized stress concentrations. This is accomplished by using a cushion material between the pipe sections and jacking system. Where extreme jacking pressures are anticipated due to long jacking distances or excessive friction forces are anticipated, additional pipe casing thickness may be required.

The pipe or casing section should be designed by a registered engineer with regard to the anticipated overburden, hydrostatic, and anticipated jacking pressures, if performed.

4.4.2 *Design and Installation Considerations*

As previously indicated, PWR, auger refusal, and/or rock were encountered at each of the three road crossings and untrenched pipe installation will likely extend through PWR, rock, and auger refusal, which is interpreted as the top of rock. Excavation and maintaining a proper alignment may be more difficult in mixed face conditions, such as PWR/rock and/or highly weathered and fractured rock/slightly weathered rock. Based on the provided 50% design documents and our exploration program, mixed face conditions will likely be encountered at each of the three road crossings.

Tunnels should be designed to accommodate the roadway loading conditions. Deflections from settlement or heave should be limited to NCDOT requirements. Limiting settlement and heave within tolerable limits is dependent on both the tunneling and overburden material and on the installation method. Survey control should be established at the ground surface along the tunnel alignment and should be monitored regularly. The contractor should be prepared to repair the roadway if any distress is noted at the roadway surface.

During installation, any voids between the casing and surrounding soil/PWR/rock should be filled with grout upon completion of the casing installation. Care should be taken to avoid excessive grouting pressures that could damage the casing or cause surface disruption to the roadway. If the casing is hydraulically advanced, friction or adhesion between the casing and surrounding materials can be reduced by injecting a bentonite slurry or other



lubricant through ports within the casing. Alternatively, a coating could be applied to the outside of the casing prior to installation to reduce friction, as well as provide some corrosion resistance.

4.4.3 *Boring and Receiving Pits*

The following items should be appropriately addressed with regard to the design and construction of the installation boring pits:

1. The design and construction of the temporary excavation and/or shoring and bracing systems for the pits should be the responsibility of the contractor. Shoring for the pits should be designed by a registered structural engineer and should be designed to withstand the lateral loads exerted by the surrounding soils, hydrostatic pressures, as well as any anticipated surcharge loads. For boring pits, the back of the pit should be designed to provide adequate thrust for the installation system. Some displacement of the wall will be necessary to develop the passive resistance of the soils behind the wall. Based on our experience we conservatively estimate the following design parameters:

Table 4-1: Untrenched Pipe Installation Pit Design Parameters

Geotechnical Design Parameters	Retained Soil		
	Fill / Alluvium	Residuum	PWR
At-Rest Lateral Earth Pressure Coefficient	$K_0 = 0.56$	$K_0 = 0.53$	$K_0 = 0.36$
Active Lateral Earth Pressure Coefficient	$K_A = 0.39$	$K_A = 0.36$	$K_A = 0.22$
Passive Lateral Earth Pressure Coefficient	$K_P = 2.56$	$K_P = 2.77$	$K_P = 4.60$
Effective Angle of Internal Friction of Soils	$\phi' = 26^\circ$	$\phi' = 28^\circ$	$\phi' = 40^\circ$
Effective Cohesion of Soils	$c' = 50$ psf	$c' = 100$ psf	$c' = 300$ psf
Moist Unit Weight of Soils	$\gamma_{\text{moist}} = 115$ pcf	$\gamma_{\text{moist}} = 125$ pcf	$\gamma_{\text{moist}} = 140$ pcf

2. For temporary excavations, shoring and bracing or flattening (laying back) of the slopes should be performed to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. We recommend that all excavated soils be placed away from the edges of the excavation, at a distance equaling or exceeding the depth of the excavation. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should we be assumed responsible for construction site safety.
3. Surface water must be directed away from the pit areas and sumps with pumps should be available to drain the pits if necessary. Groundwater was encountered within one of the borings so temporary dewatering should be anticipated during excavation and installation of the shoring systems and during construction. Temporary dewatering is discussed in more detail in Section 4.5.3.
4. A registered geotechnical engineer should visit the site once the pits are excavated. The purpose of the engineer's visit will be to confirm that adequate drainage is in place, dewatering techniques are available, if needed, and settlement hubs or other methods available to take deflection readings are in place.
5. The boring pits should be backfilled immediately after pipe installation is complete and all slopes repaired, as required.



4.5 Earthwork Considerations

4.5.1 *Existing Underground Utilities*

The project alignment crosses several roadways where utilities are present. Care should be taken as to not damage the utility lines during construction. Any loose trench backfill should be removed and replaced with properly compacted structural fill.

Utility lines can provide a conduit for water to enter excavations or tunnel areas; therefore, special attention should be given to the proximity of these lines to the construction areas and adequate protection provided to prevent surface water from entering and ponding in the excavations.

4.5.2 *Site Preparation*

Prior to excavation, stripping of topsoil, rootmat, trash, debris, vegetation, and other organic materials should be performed along the proposed alignment to reduce the risk of these materials being mixed with the underlying soils. Additionally, plans for segregating excessively wet alluvial/fill soils along the project alignment should be in place to prevent potential mixing with dryer soils.

A majority of the proposed alignment runs through areas that are currently wooded. Based on our experience, stripping depths of up to 12 inches may be required, particularly in wooded areas. Deeper stripping depths may be required in order to adequately remove large root bulbs. In addition, the depth of topsoil stripping will be dependent upon prevailing weather conditions at the time of construction. During wet conditions, rubber-tired equipment will mix topsoil with underlying "clean" soils, causing stripping depths to be greater than topsoil depths indicated on the borings. We recommend that topsoil stripping be performed with light, tracked equipment to reduce disturbance of the underlying soils, or be performed during dry periods.

4.5.3 *Temporary Dewatering*

Temporary dewatering is anticipated for utility installation in the areas along the alignment where groundwater is present above the pipe invert elevation. Depending on the amount of groundwater flow encountered, a backup dewatering system should be readily available by the contractor. Dewatering should be maintained until the pipeline installation and backfilling around the pipeline is complete. If pumping is used, at no time should pumping be performed directly beneath the exposed pipe bearing elevation since this could result in disturbance of the bearing materials and a loss of soil strength and increased settlement.

We recommend, independent of the temporary de-watering methods used, that the water level be kept a minimum of three feet below the bottom of the advancing excavation and three feet below the bottom of the excavations at all times during construction. Dewatering must be maintained **continuously** for any beneficial de-watering to be derived and a back-up system should be maintained on-site. Discontinuous pumping, for example, will result in softening of the subgrade soils and additional undercutting may be required. The contractor should also be prepared to implement additional de-watering techniques should the need arise.



Positive site drainage should be maintained away from working areas at all times to prevent ponding of water that could soften and disturb the subgrade materials. We recommend that all subgrade surfaces and fill surfaces be adequately sloped to provide positive drainage as construction progresses.

4.5.4 Temporary Excavation Stability

For temporary excavations, shoring and bracing or flattening (laying back) of the slopes should be performed to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should we be assumed responsible for construction site safety.

As previously discussed, untrenched installation pits will be required for the proposed sewer line. The system's design and construction should be the responsibility of a qualified contractor who is experienced in this type of construction. The system should be designed by a registered professional engineer.

4.5.5 Fill Material and Placement

All fill used for site grading operations should consist of a clean (free of organics and debris), low plasticity soil (Liquid Limit less than 50, Plasticity Index less than 25). The proposed fill should have a maximum dry density of at least 90 pounds per cubic foot as determined by a Standard Proctor compaction test, ASTM D 698. All fill should be placed in loose lifts not exceeding eight inches in thickness. In pavement areas (existing or proposed), fill should be compacted to a minimum of 95 percent of its Standard Proctor maximum dry density, with the final 12 inches compacted to 100 percent. Fill placed in landscaped areas, which can include plastic materials (LL greater than 50, PI greater than 25) should be compacted to a minimum of 92 percent of its Standard Proctor maximum dry density unless otherwise specified. The fill should be placed at moisture contents within +/- 3 percent of the material's optimum moisture content. We recommend that field density tests, including one-point Proctor verification tests, be performed on the fill as it is being placed. We recommend that at least one density test be performed per 200 linear feet of pipe installation per lift of fill placement.

Backfilling around the pipes should be conducted in accordance with the pipe manufacturer's recommendations. Typically, backfill on the sides of the pipe should be brought up simultaneously to prevent differential loading on the pipe. During backfilling, care should be taken to prevent over compaction of the backfill, as this could result in increased lateral stresses against the pipe.

Based on the results of the soil test borings performed and our experience with similar type materials, the clean existing low plasticity fill soils and low plasticity residual soils can typically be reused as pipe backfill. Existing fill soils should be evaluated during construction to determine their suitability for re-use as structural fill. As previously noted, the existing alluvial soils may require drying prior to re-use as structural fill. Excavated PWR and rock can be re-used as pipe backfill, provided it is crushed to fragments less than 4 inches in maximum dimension and blended with soil.

As excavations extend near the water table, the moisture content of the soils will typically become higher and it will be difficult to achieve proper compaction. The soils may also become wet due to weather conditions and on-



going construction activities. Therefore, moisture conditioning (“drying back” or “wetting”) of the soils may be required prior to reuse as structural fill.

Because of the size and length of the sewer lines, in addition to anticipated PWR and rock excavation, we expect that there will be an excess volume of soil excavated. We recommend that care be taken in separating the drier materials from the wetter materials during excavation for re-use as backfill. Since there will be an excess of soils excavated, the wetter soils could be set aside to reduce the amount of drying that may be required of backfill materials. Likewise, if unsuitable fill soils are excavated during sewer line excavation, these soils should be separated from the other excavated materials and removed from the site.

5.0 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, bacteria). If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

S&ME should be retained to review the final plans and specifications to confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME’s review of final plans and specifications followed by our observation and monitoring of earthwork and foundation construction activities.

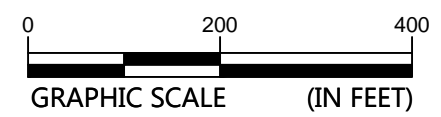
Appendix

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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



LEGEND

- APPROXIMATE SOIL TEST BORING LOCATION
- APPROXIMATE ROD SOUNDING LOCATION

NOTE: 2015 AERIAL OBTAINED FROM NC ONEMAP. DO NOT USE DRAWING TO DETERMINE DISTANCES OR QUANTITIES.

SCALE:

1" = 200'

DATE:

1/16/2018

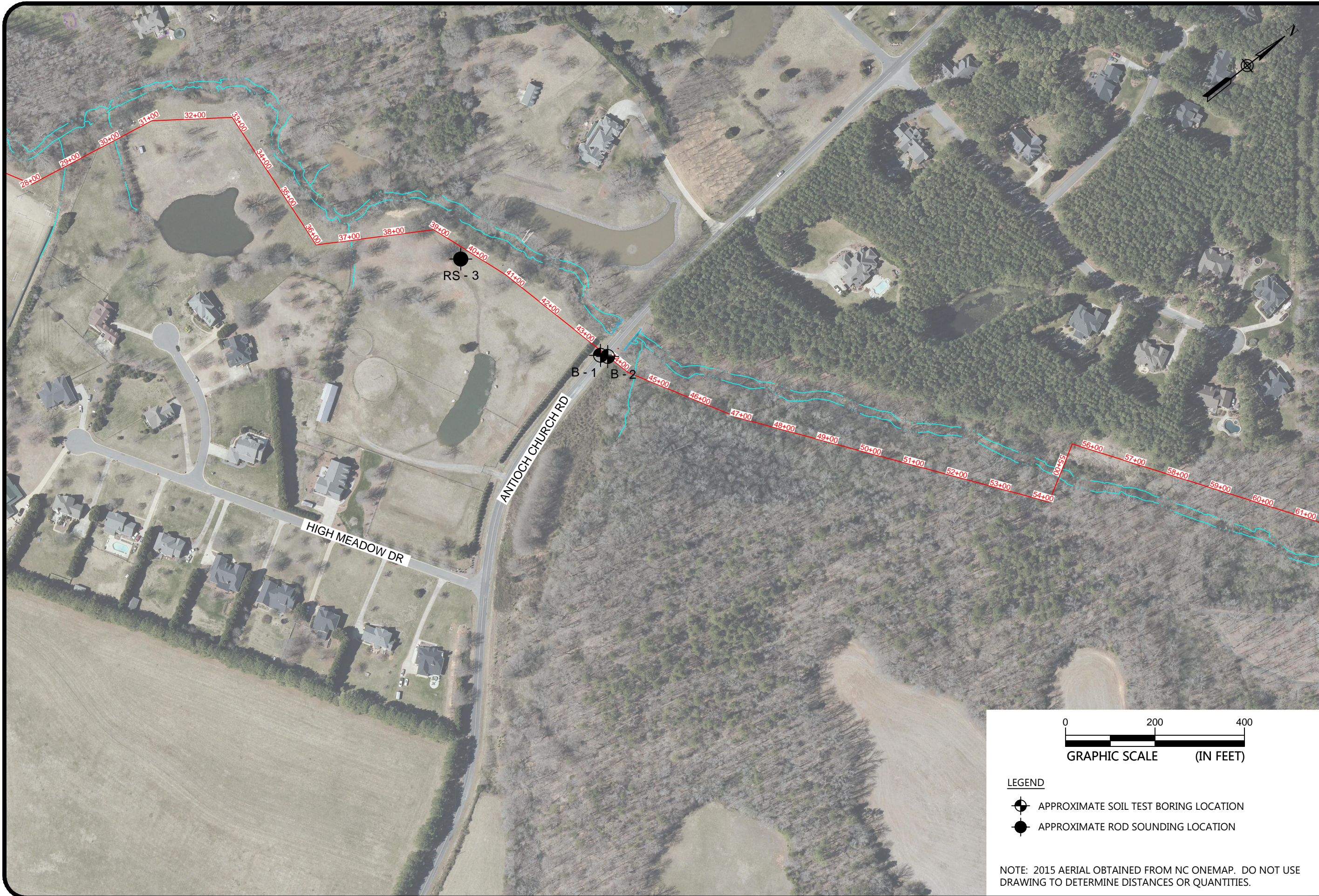
PROJECT NUMBER

1335-17-037

FIGURE NO.

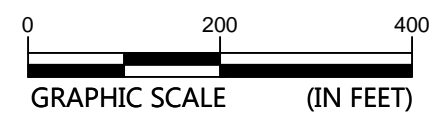
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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



- LEGEND**
- APPROXIMATE SOIL TEST BORING LOCATION
 - APPROXIMATE ROD SOUNDING LOCATION

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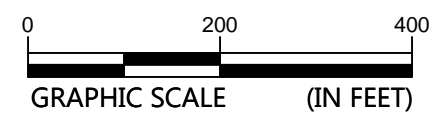
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DATE:	1/16/2018
PROJECT NUMBER	1335-17-037
FIGURE NO.	



Drawing path: T:\Projects\2017\GEO\1335-17-037 West Fork 12 Mile Creek\Graphics\ALIGNMENTS SBORES CRK CROSSINGS_SME.DWG



TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina

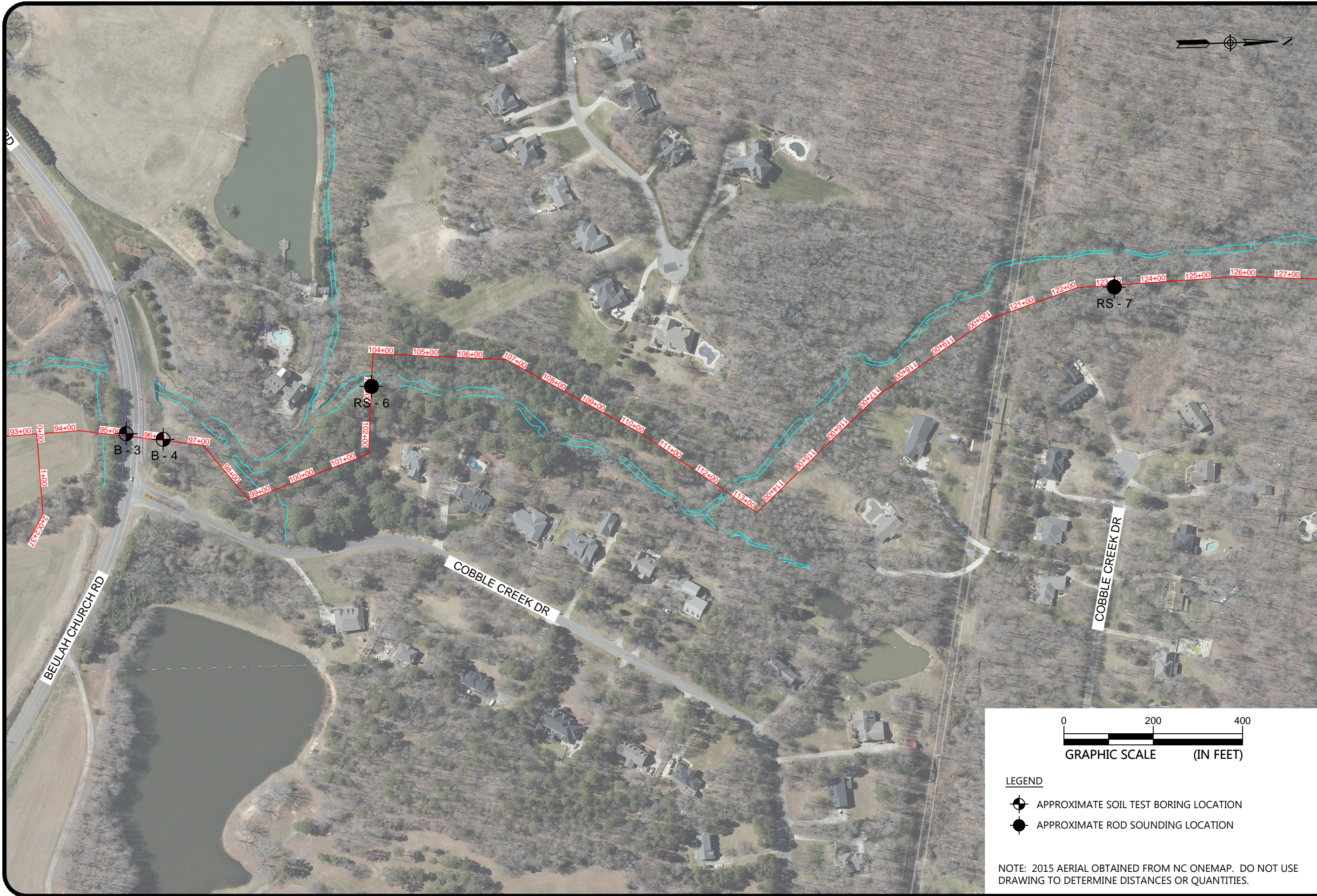


- LEGEND**
-  APPROXIMATE SOIL TEST BORING LOCATION
 -  APPROXIMATE ROD SOUNDING LOCATION

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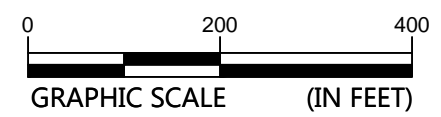
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PROJECT NUMBER	1335-17-037
FIGURE NO.	4

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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



- LEGEND**
- APPROXIMATE SOIL TEST BORING LOCATION
 - APPROXIMATE ROD SOUNDING LOCATION

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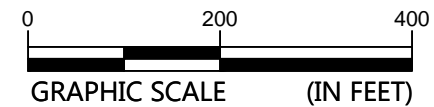
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PROJECT NUMBER	1335-17-037
FIGURE NO.	

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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



LEGEND

- APPROXIMATE SOIL TEST BORING LOCATION
- APPROXIMATE ROD SOUNDING LOCATION

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SCALE:

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1/16/2018

PROJECT NUMBER

1335-17-037

FIGURE NO.

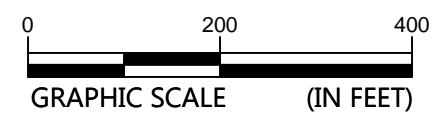
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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



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- APPROXIMATE ROD SOUNDING LOCATION

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SCALE:

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1/16/2018

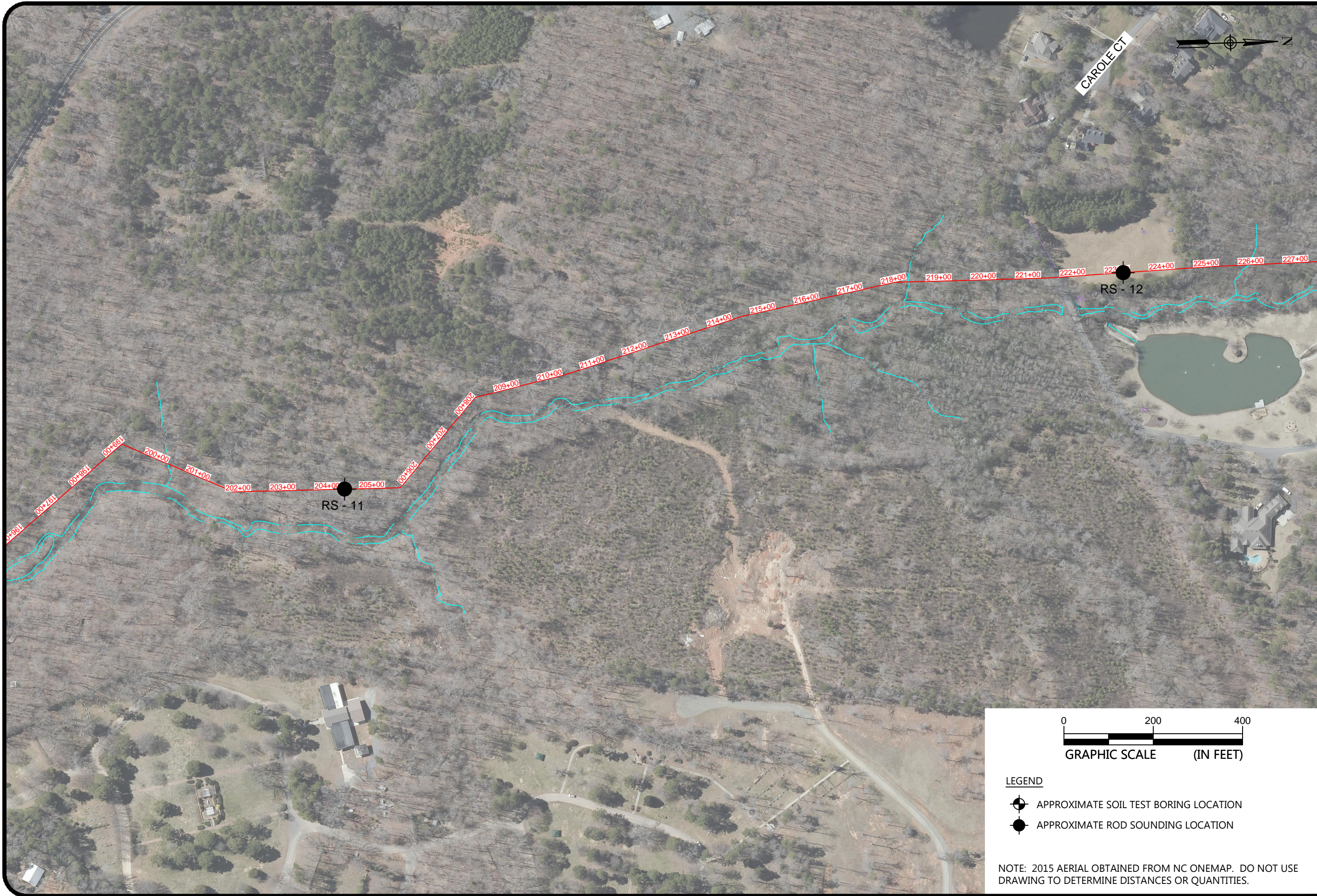
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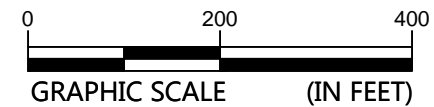
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TEST LOCATION PLAN

WEST FORK TWELVE MILE CREEK INTERCEPTOR
Union County, North Carolina



LEGEND

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- APPROXIMATE ROD SOUNDING LOCATION

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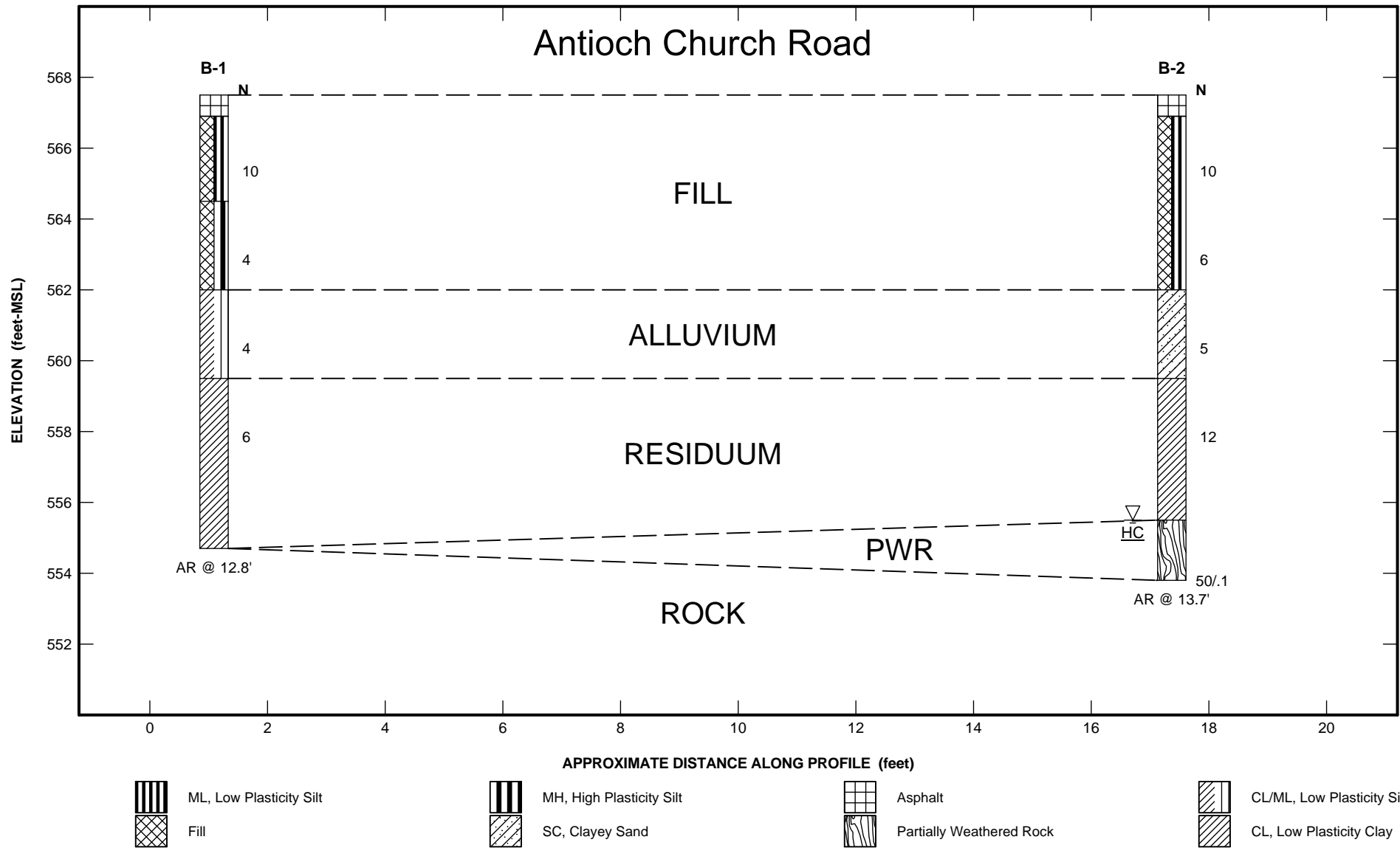
1/16/2018

PROJECT NUMBER

1335-17-037

FIGURE NO.


8



N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

JOB NO: 1335-17-037

DATE: 1/3/2018

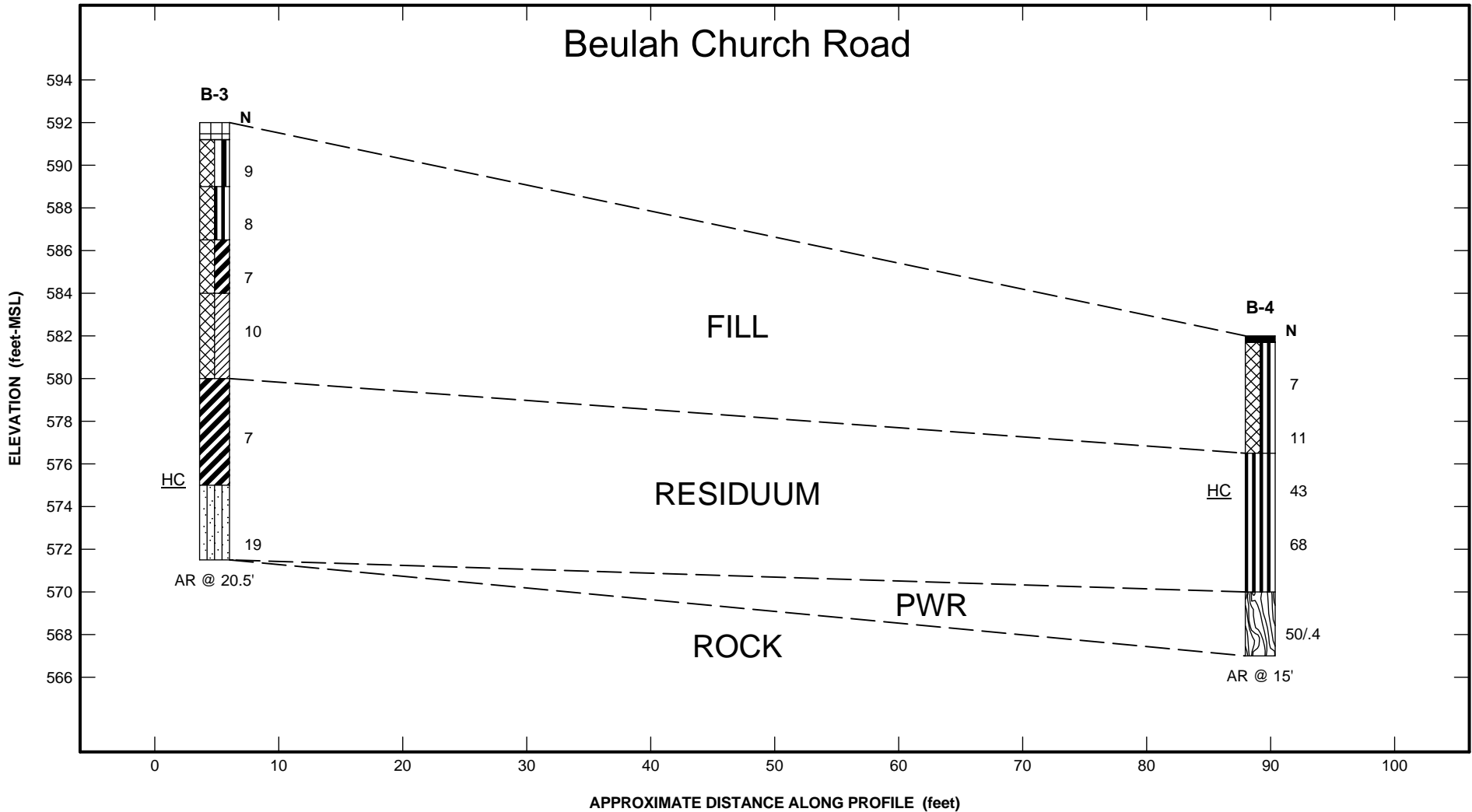


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 F: (704) 525-3953

Diagram: Generalized Subsurface Profile
 Location: Antioch Church Road Crossing
 Project: West Fork 12 Mile Creek Interceptor
 Location: Union County, North Carolina

Figure:
A

Beulah Church Road



N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

JOB NO: 1335-17-037

DATE: 1/3/2018



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Diagram: Generalized Subsurface Profile

Location: Beulah Church Road Crossing

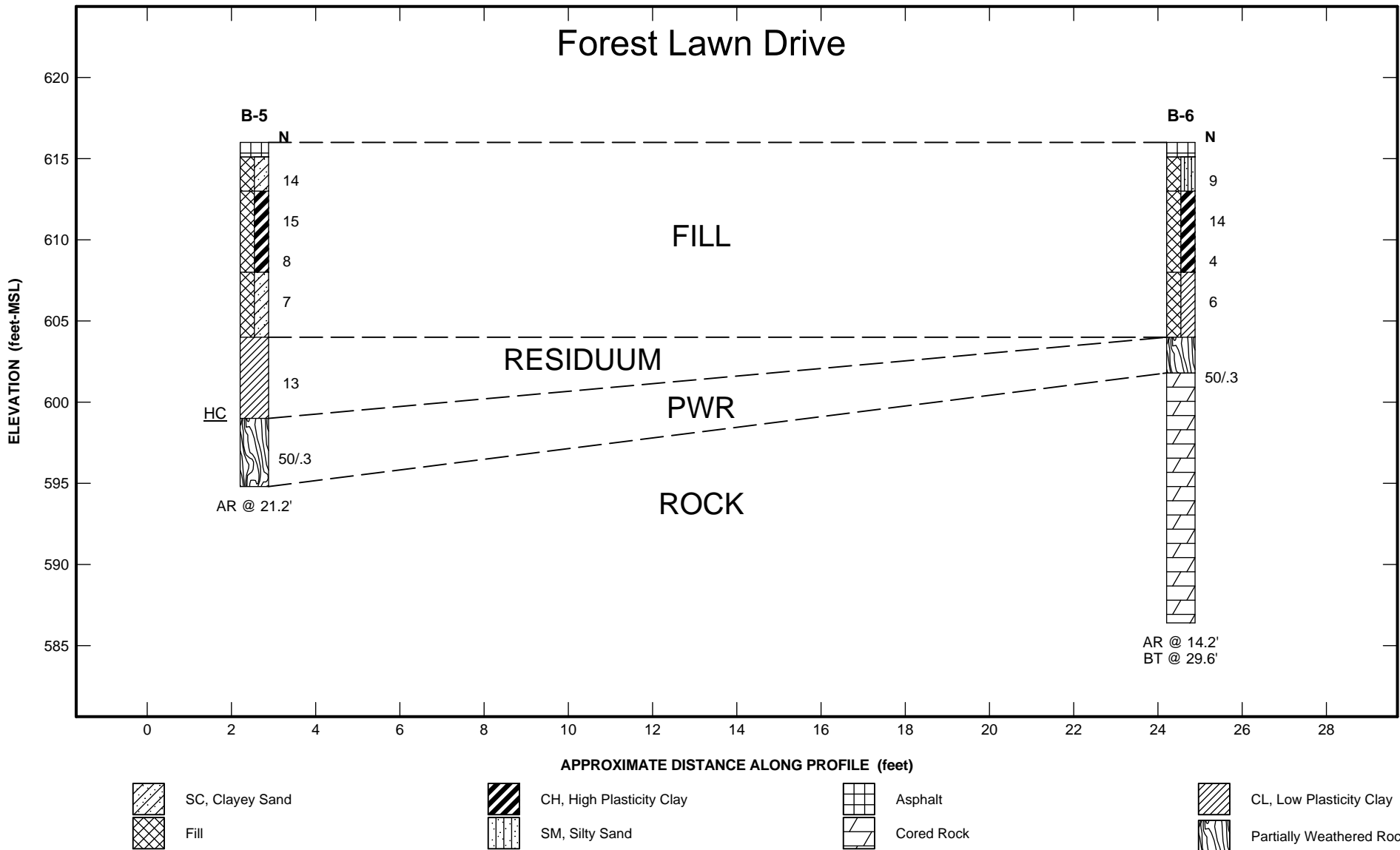
Project: West Fork 12 Mile Creek Interceptor

Location: Union County, North Carolina

Figure:

B

Forest Lawn Drive



N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

JOB NO: 1335-17-037

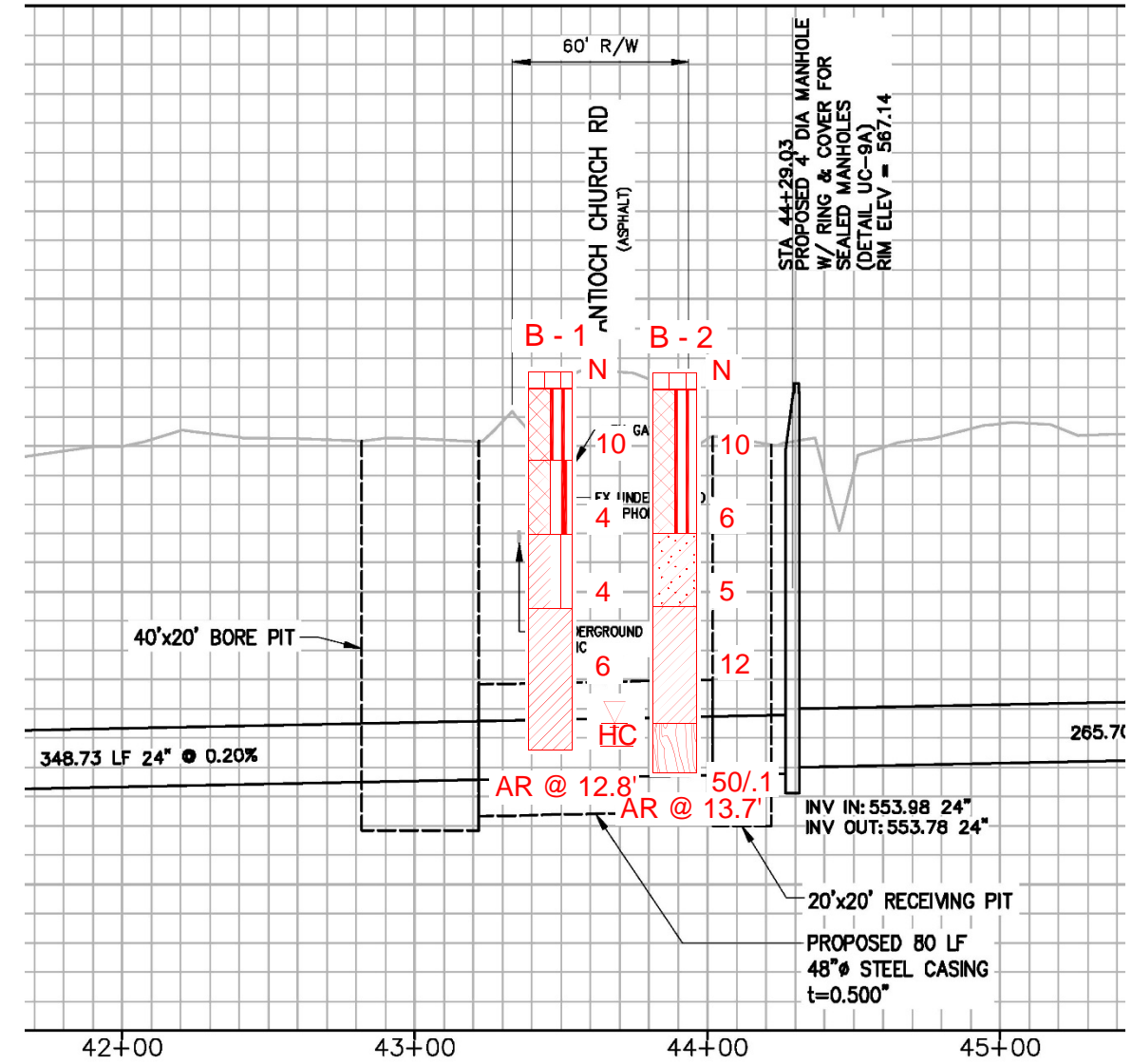
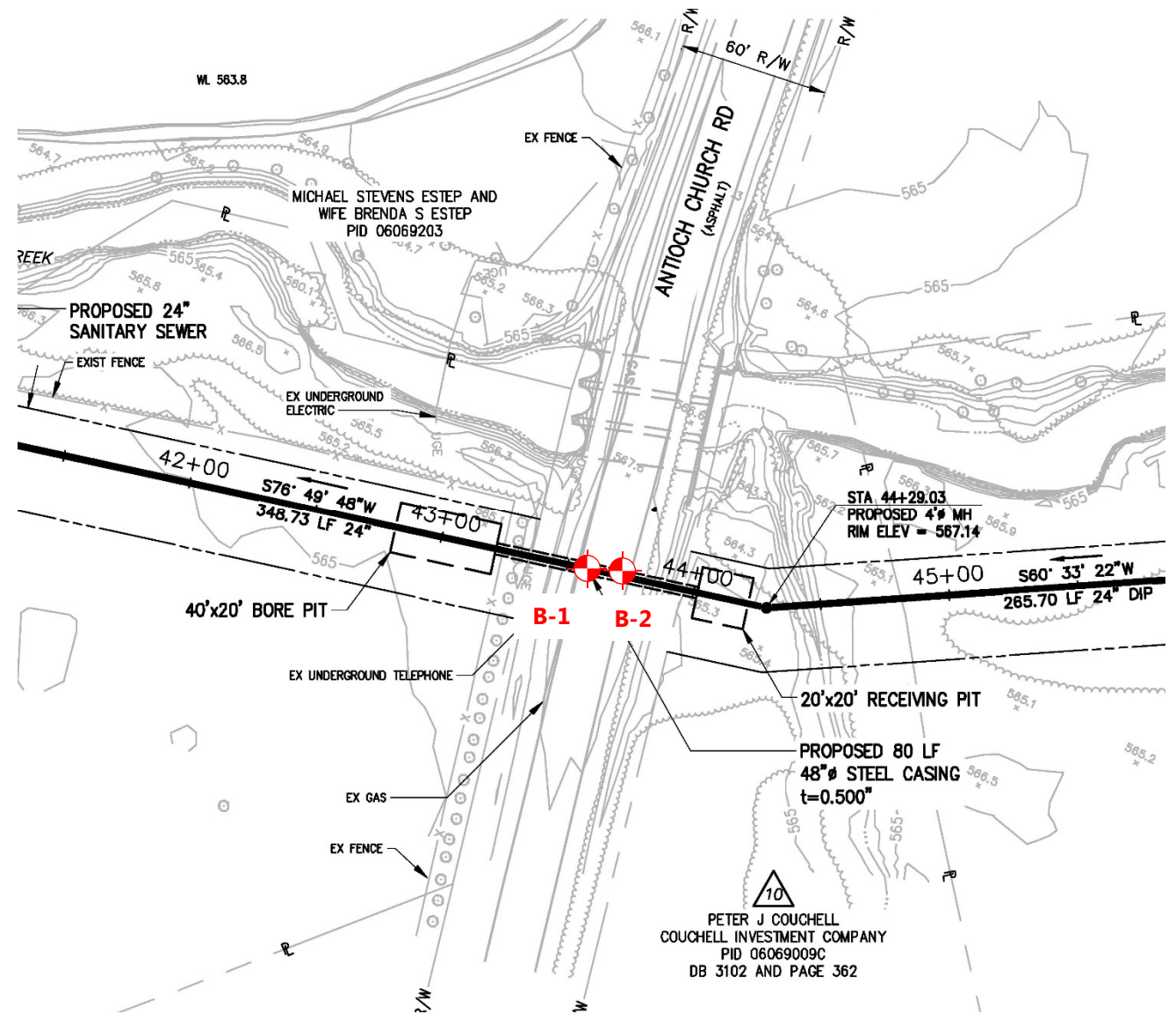
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 F: (704) 525-3953

Diagram: Generalized Subsurface Profile
 Location: Forest Lawn Drive Crossing
 Project: West Fork 12 Mile Creek Interceptor
 Location: Union County, North Carolina

Figure:
C



NOTE: 50% Plans dated January 2018 obtained from Hazen and modified by S&ME to show the approximate boring locations. Drawing should not be used for the measurement or estimation of quantities or distances.

LEGEND	
	APPROXIMATE BORING LOCATION
	BORING CROSS-SECTION

Antioch Church Road Crossing

WEST FORK TWELVE MILE CREEK INTERCEPTOR
UNION COUNTY, NORTH CAROLINA

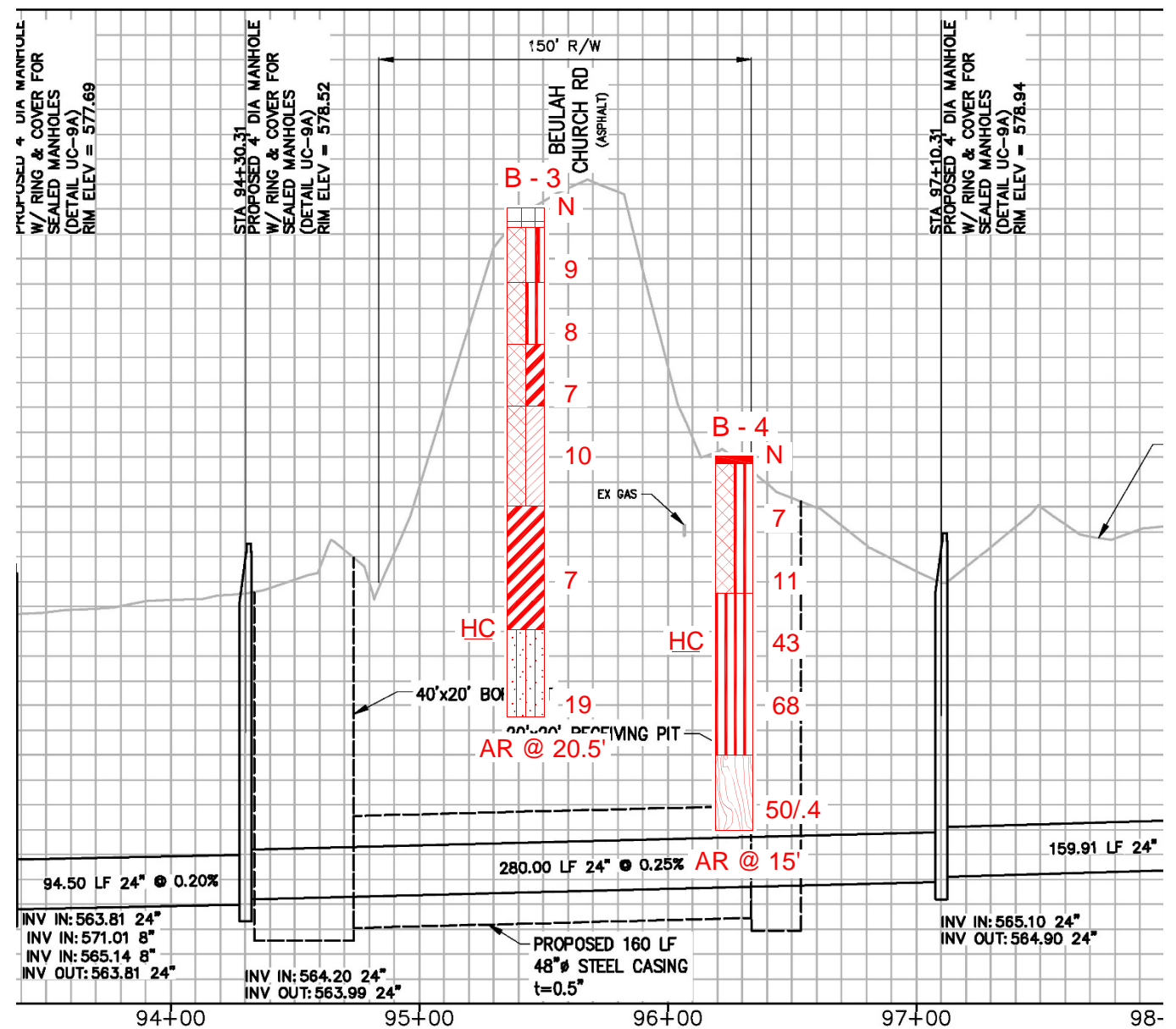
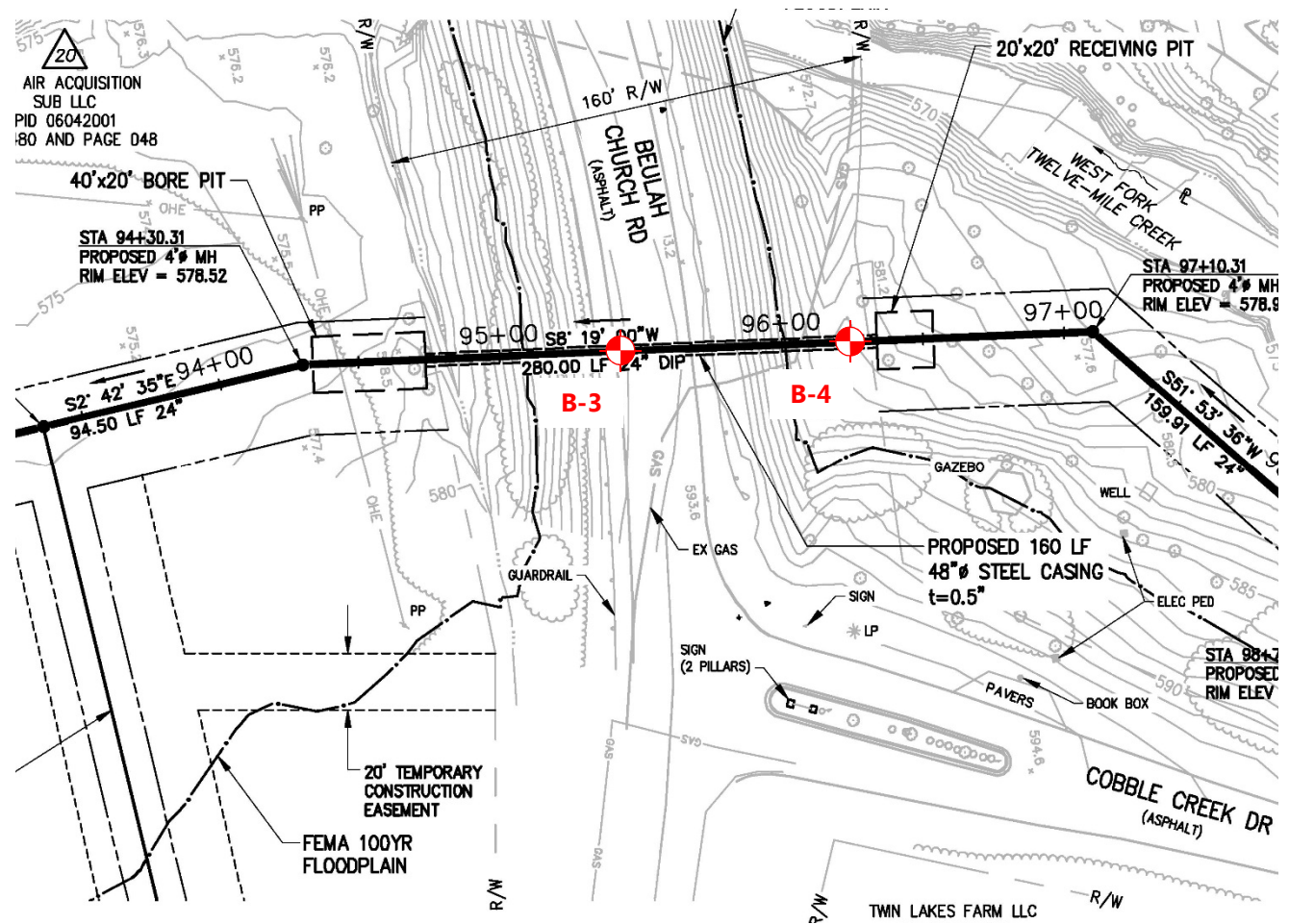
SCALE:
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DATE:
1/16/2018

PROJECT NUMBER
1335-17-037

FIGURE NO.

D



NOTE: 50% Plans dated January 2018 obtained from Hazen and modified by S&ME to show the approximate boring locations. Drawing should not be used for the measurement or estimation of quantities or distances.

LEGEND

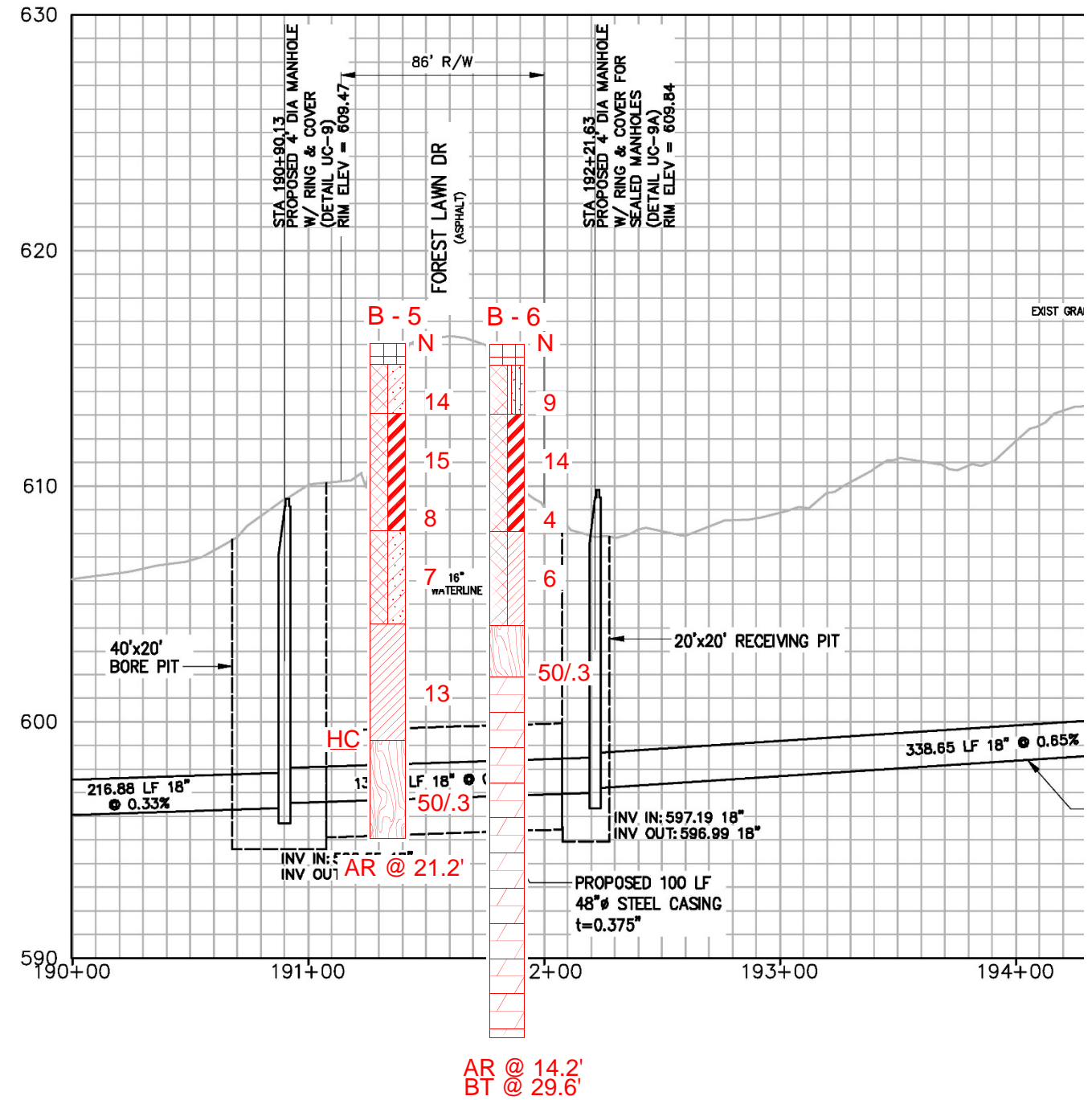
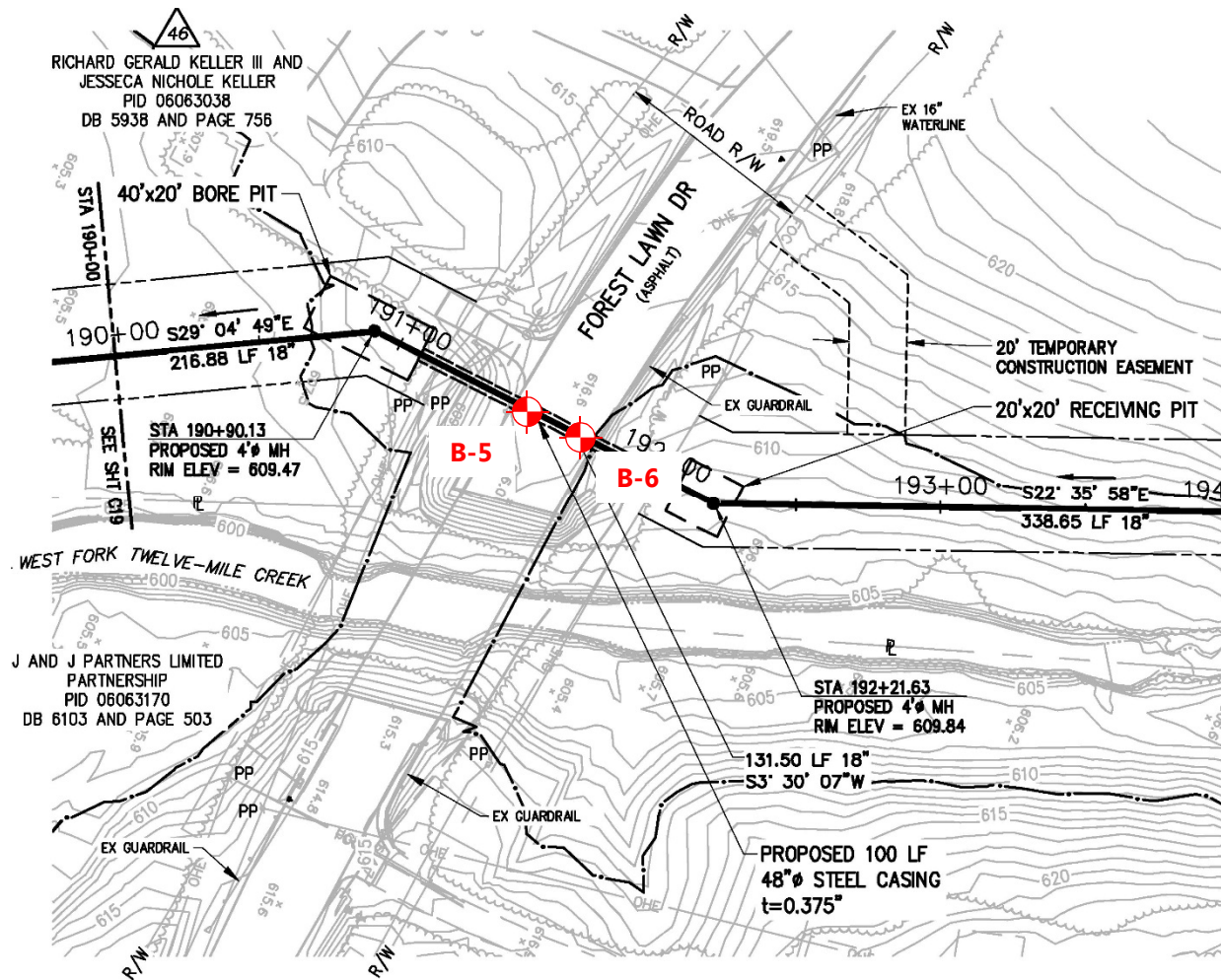
- APPROXIMATE BORING LOCATION
- BORING CROSS-SECTION

Beulah Church Road Crossing

WEST FORK TWELVE MILE CREEK INTERCEPTOR
 UNION COUNTY, NORTH CAROLINA

SCALE: AS SHOWN
DATE: 1/16/2018
PROJECT NUMBER 1335-17-037
FIGURE NO.

E



LEGEND	
	APPROXIMATE BORING LOCATION
	BORING CROSS-SECTION

NOTE: 50% Plans dated January 2018 obtained from Hazen and modified by S&ME to show the approximate boring locations. Drawing should not be used for the measurement or estimation of quantities or distances.

Forest Lawn Drive Crossing

WEST FORK TWELVE MILE CREEK INTERCEPTOR
UNION COUNTY, NORTH CAROLINA





















SCALE:
AS SHOWN
DATE:
1/16/2018
PROJECT NUMBER
1335-17-037
FIGURE NO.

F

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS




SOIL TYPES

(Shown in Graphic Log)

	Fill
	Asphalt
	Concrete
	Topsoil
	Partially Weathered Rock
	Cored Rock
	GW WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	GP POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	GM SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	GC CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SW WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SM SILTY SANDS, SAND - SILT MIXTURES
	SC CLAYEY SANDS, SAND - CLAY MIXTURES
	ML INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	MH INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS, ELASTIC SILTS
	CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH ORGANIC SILTS AND ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY

WATER LEVELS

(Shown in Water Level Column)

-  = Water Level At Termination of Boring
-  = Water Level Taken After 24 Hours
-  = Loss of Drilling Water
- HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY

Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

STD. PENETRATION
RESISTANCE
BLOWS/FOOT

RELATIVE DENSITY OF COHESIONLESS SOILS





RELATIVE DENSITY

Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

STD. PENETRATION
RESISTANCE
BLOWS/FOOT

SAMPLER TYPES

(Shown in Samples Column)

-  Shelby Tube
-  Split Spoon
-  Rock Core
-  No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D 1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.



DATE DRILLED: 11/16/17	ELEVATION: 567.5 ft	NOTES: Antioch Church Road Northing and easting was recorded using a handheld GPS unit. Elevation should be considered approximate.
DRILL RIG: CME-55	BORING DEPTH: 12.8 ft	
DRILLER: T. Miller	WATER LEVEL: Not Encountered	
HAMMER TYPE: Automatic	LOGGED BY: N. Bradley	
SAMPLING METHOD: Split spoon		NORTHING: 462633 EASTING: 1488390
DRILLING METHOD: 3 1/4" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS STANDARD PENETRATION TEST DATA (blows/ft)	N VALUE
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD		
		Asphalt (4 inches) over ABC Stone (3 inches) FILL: SANDY SILT (ML) - stiff, brown, dry FILL: CLAYEY SILT (MH) - soft, brown, moist ALLUVIUM: SANDY CLAY (CL-ML) - soft, gray, wet RESIDIUM: SANDY CLAY (CL) - firm, gray brown, moist										
5				562.5	SS-1	4	SS	4	5	5	10	10
					SS-2	2	SS	2	2	2	4	4
					SS-3	2	SS	2	2	2	4	4
10				557.5	SS-4	2	SS	2	3	3	6	6
		Refusal at 12.8 feet Boring terminated at 12.8 feet										

S&ME BORING LOG BORING LOGS.GPJ S&ME.GDT 1/15/18

DATE DRILLED: 11/16/17	ELEVATION: 567.5 ft	NOTES: Antioch Church Road Northing and easting was recorded using a handheld GPS unit. Elevation should be considered approximate.
DRILL RIG: CME-55	BORING DEPTH: 13.7 ft	
DRILLER: T. Miller	WATER LEVEL: 12 feet on 11/16/17	
HAMMER TYPE: Automatic	LOGGED BY: N. Bradley	
SAMPLING METHOD: Split spoon		NORTHING: 462644 EASTING: 1488402
DRILLING METHOD: 3/4" H.S.A.		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS					N VALUE	
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft)						
												10	20	30	60	80	
	[Hatched Box]	Asphalt (4 inches) over ABC Stone (3 inches)															
	[Cross-hatched Box]	FILL: SANDY SILT (ML) - stiff to firm, brown, moist		562.5	SS-1	2	[Symbol]	2	5	5		10					10
5		ALLUVIUM: CLAYEY SAND (SC) - loose, gray brown, fine grained, wet			SS-2	4	[Symbol]	4	3	3		6					6
	[Dotted Box]	RESIDIUM: SANDY CLAY (CL) - stiff, gray brown, moist			SS-3	2	[Symbol]	2	2	3		5					5
10		PARTIALLY WEATHERED ROCK: SANDY GRAVEL - gray tan	[Symbol]	557.5	SS-4	3	[Symbol]	3	5	7		12					12
		Refusal at 13.7 feet Boring terminated at 13.7 feet			SS-5	50/1	[Symbol]	50/1				50/1					50/1

S&ME BORING LOG - BORING LOGS.GPJ S&ME.GDT 1/15/18

DATE DRILLED: 11/16/17	ELEVATION: 592.0 ft	NOTES: Beulah Church Road Northing and easting was recorded using a handheld GPS unit. Elevation should be considered approximate.
DRILL RIG: CME-55	BORING DEPTH: 20.5 ft	
DRILLER: T. Miller	WATER LEVEL: Not Encountered	
HAMMER TYPE: Automatic	LOGGED BY: N. Bradley	
SAMPLING METHOD: Split spoon		NORTHING: 466713
DRILLING METHOD: 3/4" H.S.A.		EASTING: 1489470

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS	N VALUE
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD		
		Asphalt (6 inches) over ABC Stone (3 inches)										
		FILL: CLAYEY SILT (MH) - stiff, red brown, moist			SS-1	4	5	4				9
		FILL: SANDY SILT (ML) - firm, tan brown, trace rock pieces, moist		587.0	SS-2	3	4	4				8
		FILL: SILTY CLAY (CH) - firm, tan brown, moist			SS-3	3	3	4				7
		FILL: SANDY CLAY (CL) - stiff, tan brown, trace rock pieces, moist		582.0	SS-4	3	4	6				10
		RESIDUUM: SILTY CLAY (CH) - firm, red brown, moist		577.0	SS-5	2	3	4				7
		SILTY SAND (SM) - medium dense, gray brown, moist	HC	572.0	SS-6	5	5	14				19
		Refusal at 20.5 feet Boring terminated at 20.5 feet										

S&ME BORING LOG BORING LOGS.GPJ S&ME.GDT 1/15/18

NOTES:

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



DATE DRILLED: 11/28/17	ELEVATION: 582.0 ft	NOTES: Beulah Church Road Northing and easting was recorded using a handheld GPS unit. Elevation should be considered approximate.	
DRILL RIG: CME 45-B	BORING DEPTH: 15.0 ft		
DRILLER: S. Hardee	WATER LEVEL: Not Encountered		
HAMMER TYPE: Automatic	LOGGED BY: L. Campos		
SAMPLING METHOD: Split spoon		NORTHING: 466796	EASTING: 1489485
DRILLING METHOD: 3 1/4" H.S.A.			

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS	N VALUE
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD		
	[Cross-hatched pattern]	Topsoil (3 inches)										
	[Diagonal lines pattern]	FILL: SANDY SILT (ML) - firm to stiff, orange brown, dry		577.0	SS-1	3	SS	3	3	4	7	7
5					SS-2	6	SS	5	6		11	11
	[Vertical lines pattern]	RESIDUUM: SANDY SILT (ML) - hard to very hard, gray brown, dry	HC		SS-3	11	SS	16	27		43	43
10				572.0	SS-4	22	SS	30	38		68	68
	[Wavy lines pattern]	PARTIALLY WEATHERED ROCK: SANDY SILT - gray brown			SS-5	50.4	SS				110	50.4
15		Refusal at 15 feet Boring terminated at 15 feet		567.0								

S&ME BORING LOG BORING LOGS.GPJ S&ME.GDT 1/15/18

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DATE DRILLED: 11/17/17	ELEVATION: 616.0 ft	NOTES: Forest Lawn Drive Northing and easting was recorded using a handheld GPS unit. Elevation should be considered approximate.
DRILL RIG: CME-55	BORING DEPTH: 21.2 ft	
DRILLER: T. Miller	WATER LEVEL: Not Encountered	
HAMMER TYPE: Automatic	LOGGED BY: N. Bradley	
SAMPLING METHOD: Split spoon		NORTHING: 474661
DRILLING METHOD: 3/4" H.S.A.		EASTING: 1488910

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS	N VALUE
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD		
											10 20 30 60 80	
	[Hatched Pattern]	Asphalt (8 inches) over ABC Stone (3 inches)										
	[Diagonal Hatched Pattern]	FILL: CLAYEY SAND (SC) - medium dense, dark brown, fine to medium grained, moist			SS-1	5	▲	5	6	8		14
5	[Diagonal Hatched Pattern]	FILL: SILTY CLAY (CH) - stiff to firm, red brown, trace rock pieces, moist		611.0	SS-2	6	▲	6	10	5		15
	[Diagonal Hatched Pattern]	FILL: CLAYEY SAND (SC) - loose, orange brown, trace rock pieces, moist			SS-3	4	▲	4	3	5		8
10	[Diagonal Hatched Pattern]	FILL: CLAYEY SAND (SC) - loose, orange brown, trace rock pieces, moist		606.0	SS-4	2	▲	2	3	4		7
	[Diagonal Hatched Pattern]	RESIDUUM: SANDY CLAY (CL) - stiff, tan gray, wet			SS-5	6	▲	6	6	7		13
15	[Diagonal Hatched Pattern]	RESIDUUM: SANDY CLAY (CL) - stiff, tan gray, wet		601.0								
	[Wavy Pattern]	PARTIALLY WEATHERED ROCK: SANDY GRAVEL - gray	HC		SS-6	21	▲	21	50/3	3		100
20	[Wavy Pattern]	PARTIALLY WEATHERED ROCK: SANDY GRAVEL - gray		596.0								50/3
		Refusal at 21.2 feet Boring terminated at 21.2 feet										

S&ME BORING LOG BORING LOGS.GPJ S&ME.GDT 1/15/18

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PROJECT: West Fork 12 Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		BORING LOG B-6											
DATE DRILLED: 11/17/17		ELEVATION: 616.0 ft											
DRILL RIG: CME-55		BORING DEPTH: 29.6 ft											
DRILLER: T. Miller		WATER LEVEL: Not Encountered											
HAMMER TYPE: Automatic		LOGGED BY: N. Bradley											
SAMPLING METHOD: Rock Core, Split spoon		NORTHING: 474683											
DRILLING METHOD: 3/4" H.S.A.		EASTING: 1488910											
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA			REMARKS	N VALUE	
								1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD			STANDARD PENETRATION TEST DATA (blows/ft)
		Asphalt (8 inches) over ABC Stone (3 inches)											
		FILL: SILTY SAND (SM) - loose, dark brown, moist			SS-1	4	4	5					9
5		FILL: SILTY CLAY (CH) - stiff to soft, red brown, trace rock pieces, moist to wet		611.0	SS-2	8	10	4					14
		FILL: SANDY CLAY (CL) - firm, brown gray, trace rock pieces, moist			SS-3	2	2	2					4
10		FILL: SANDY CLAY (CL) - firm, brown gray, trace rock pieces, moist		606.0	SS-4	2	3	3					6
		PARTIALLY WEATHERED ROCK: SANDY GRAVEL - gray tan			SS-5	21	50/3						100
15		CRYSTALLINE ROCK - METAVOLCANIC ROCK: gray, hard, very slightly to slightly weathered, close to very close fracture spacing with 3 joints @ 10°, 4 joints @ 20°, 6 joints @ 30°, 9 joints @ 45°, 7 joints @ 60°, 11 joints @ 70°, and 2 joints @ 80°		601.0	RC-1				100%	0%			50/3
					RC-2				100%	76%			
20				596.0	RC-3				100%	56%			
25				591.0	RC-4				100%	90%			
		Refusal at 14.2 feet Boring terminated at 29.6 feet											

S&ME BORING LOG BORING LOGS.GPJ S&ME.GDT 1/15/18

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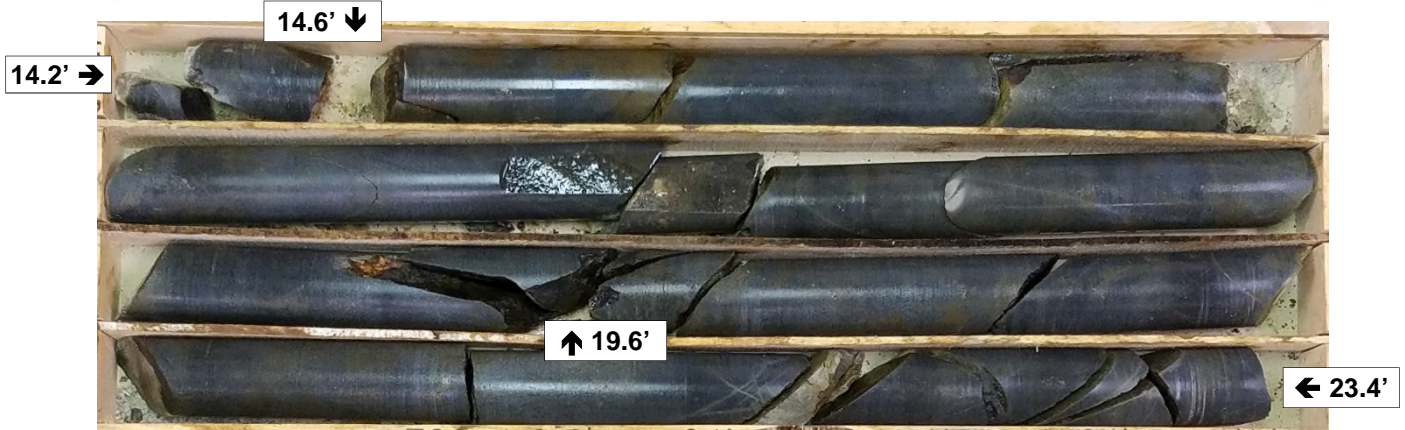




ROCK CORE PHOTOS

Project Name: West Fork Twelve Mile Creek Interceptor		
Boring No.: B-6	Location: Union County, North Carolina	Driller: T. Miller
Project No.: 1335-17-037	Equipment: CME-55	Logged By: N. Bradley
Core Size: NQ2	Total Run: 15.4 feet	Date: 11/17/2017

FEET



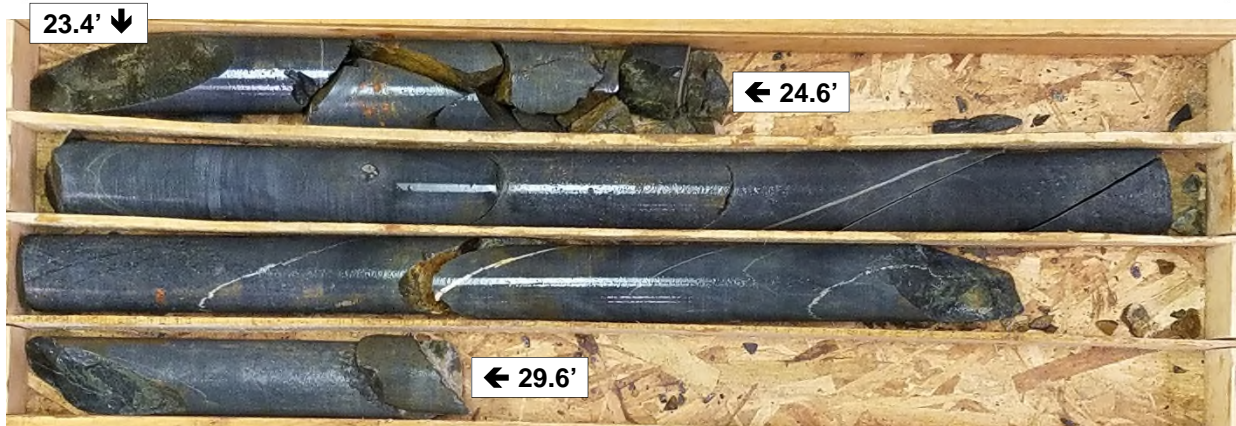
Box 1 of 2; Top of Box @ 14.2 Feet; Bottom of Box @ 23.4 Feet



ROCK CORE PHOTOS

Project Name: West Fork Twelve Mile Creek Interceptor		
Boring No.: B-6	Location: Union County, North Carolina	Driller: T. Miller
Project No.: 1335-17-037	Equipment: CME-55	Logged By: N. Bradley
Core Size: NQ2	Total Run: 15.4 feet	Date: 11/17/2017

FEET



Box 2 of 2; Top of Box @ 23.4 Feet; Bottom of Box @ 29.6 Feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-2	
ELEVATION	NORTH	461485	EAST	1487052	DATE	12/12/2017
DEPTH	8 feet	DRILL METHOD	Rod Sounding		FIELD TECHS.	T. Hill



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					NOTES	
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100		
	0	4	4							Station 23+00
	5	7	12							
	8	10	18							
	17	16	33							
5	17	17	34							
	16	16	32							
	20	27	47							
	28	32	60							
	10/0									
10										Refusal at 8 feet
15										

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-3	
ELEVATION	NORTH	462520	EAST	1488028	DATE	12/12/2017
DEPTH	8.7 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill		



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					NOTES
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100	
	0	4	4						Station 39+75
	6	10	16						
	8	12	20						
	16	18	34						
5	15	17	32						
	18	16	34						
	15	16	31						
	16	17	33						
	20	10/2							
10									
15									

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-4
ELEVATION	NORTH	463977	EAST	1489544	DATE 12/12/2017
DEPTH	3.8 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill	



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100
	0	3	3					
	6	10	16					
	23	27	50					
	34	43/3						
5								
10								
15								

NOTES

Station 64+75

Refusal at 3.8 feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-6
ELEVATION	NORTH	467265	EAST	1489380	DATE 12/12/2017
DEPTH	6 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill	



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100

NOTES

5	0	0	0						Station 103+00
	0	2	2						
	3	3	6						
	8	17	25						
	19	18	37						
	23	47	70						
	10/0								
10									
15									Refusal at 6 feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-7	
ELEVATION	NORTH	468935	EAST	1489207	DATE	12/12/2017
DEPTH	5.7 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill		



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100
0	0	3	3					
2	2	4	6					
3	3	4	7					
9	9	12	21					
12	12	15	27					
17	17	11/2						
5								
10								
15								

NOTES

Station 123+00

Refusal at 5.7 feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-9
ELEVATION	NORTH	472616	EAST	1488224	DATE 12/12/2017
DEPTH	7.2 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill	



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100
0	0	1	1					
7	7	11	18					
12	12	11	23					
15	15	17	32					
35	35	51	86					
43	43	39	82					
28	28	40	68					
20/.2	20/.2							
10								
15								

NOTES

Station 164+25

Refusal at 7.2 feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-10	
ELEVATION	NORTH	474057	EAST	1489093	DATE	12/13/2017
DEPTH	5.9 feet	DRILL METHOD	Rod Sounding		FIELD TECHS.	T. Hill



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100
5	0	2	2					
	4	5	9					
	6	10	16					
	8	12	20					
	16	20	36					
	25	30/4						
10								
15								

NOTES

Station 184+25

Refusal at 5.9 feet

ROD SOUNDING LOG

PROJECT		West Fork Twelve Mile Creek Interceptor Union County, North Carolina S&ME Project No. 1335-17-037		TEST NUMBER	RS-13	
ELEVATION	NORTH	461061	EAST	1487918	DATE	12/12/2017
DEPTH	5.8 feet	DRILL METHOD Rod Sounding		FIELD TECHS. T. Hill		



DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				
	0.5 ft	0.5 ft	TOTAL	0	25	50	75	100
5	0	3	3					
	3	6	9					
	8	12	20					
	26	28	54					
	36	37	73					
	46	40/3						
10				<p style="text-align: center;">Refusal at 5.8 feet</p>				
15								

NOTES

Station 10+25
(Scotch Meadows Alignment)

Refusal at 5.8 feet

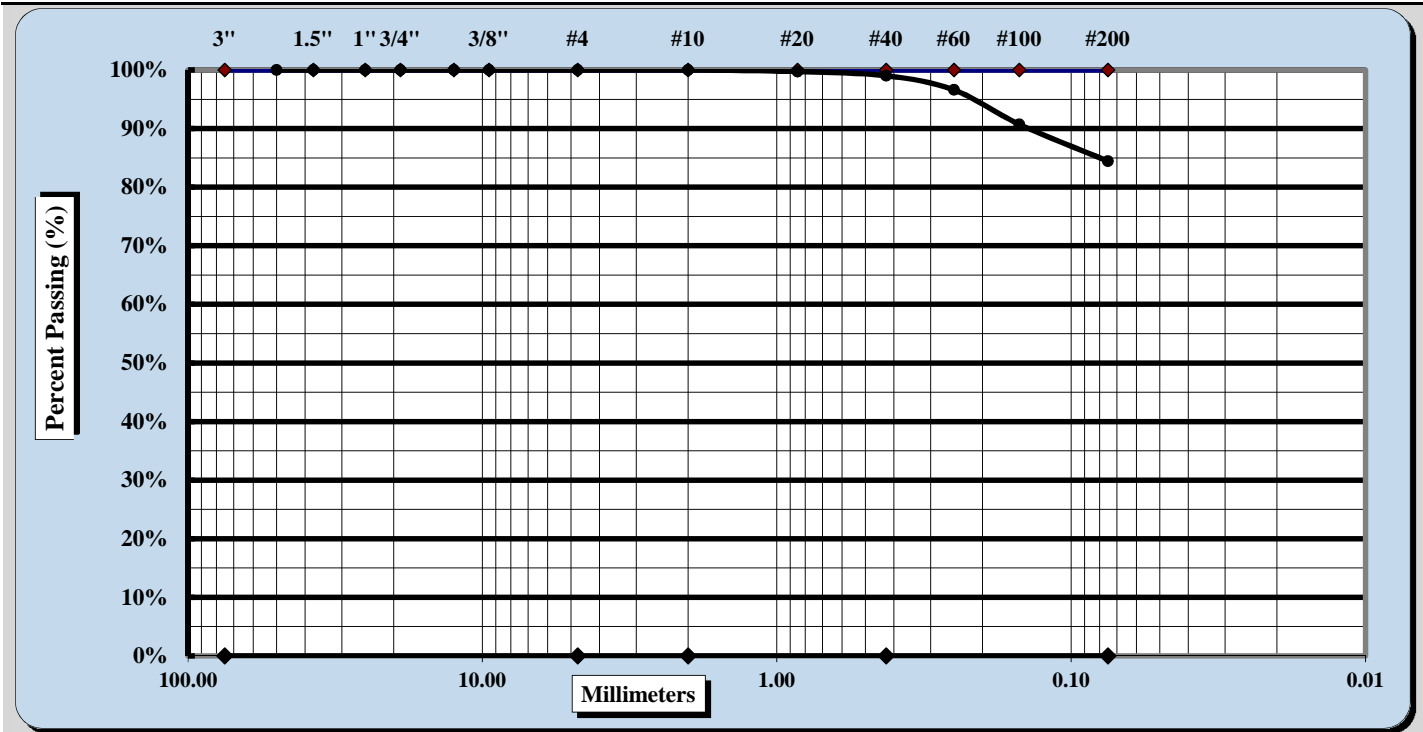


ASTM D 422

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1335-17-037 (01)	Report Date:	12/11/17
Project Name:	West Fork 12 Mile Creek Interceptor	Test Date(s):	11/25-12/11/17
Client Name:	Hazen & Sawyer		
Client Address:	NA		
Sample Id.	B-1	Type:	Split Spoon
		Sample Date:	11/16/17
Location:	Borehole	Sample:	SS-3
		Depth:	6-7.5'

Sample Description: Gray Sandy Clay (CL-ML)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#20	Coarse Sand	0.0%	Fine Sand	14.6%
Gravel	0.0%	Medium Sand	1.0%	Silt & Clay	84.4%
Liquid Limit	25	Plastic Limit	20	Plastic Index	5
Specific Gravity	ND			Moisture Content	23.6%
Coarse Sand	0.0%	Medium Sand	1.0%	Fine Sand	14.6%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Nate Bradley
Technical Responsibility

Nate Bradley
Signature

Staff Professional
Position

1/3/2018
Date

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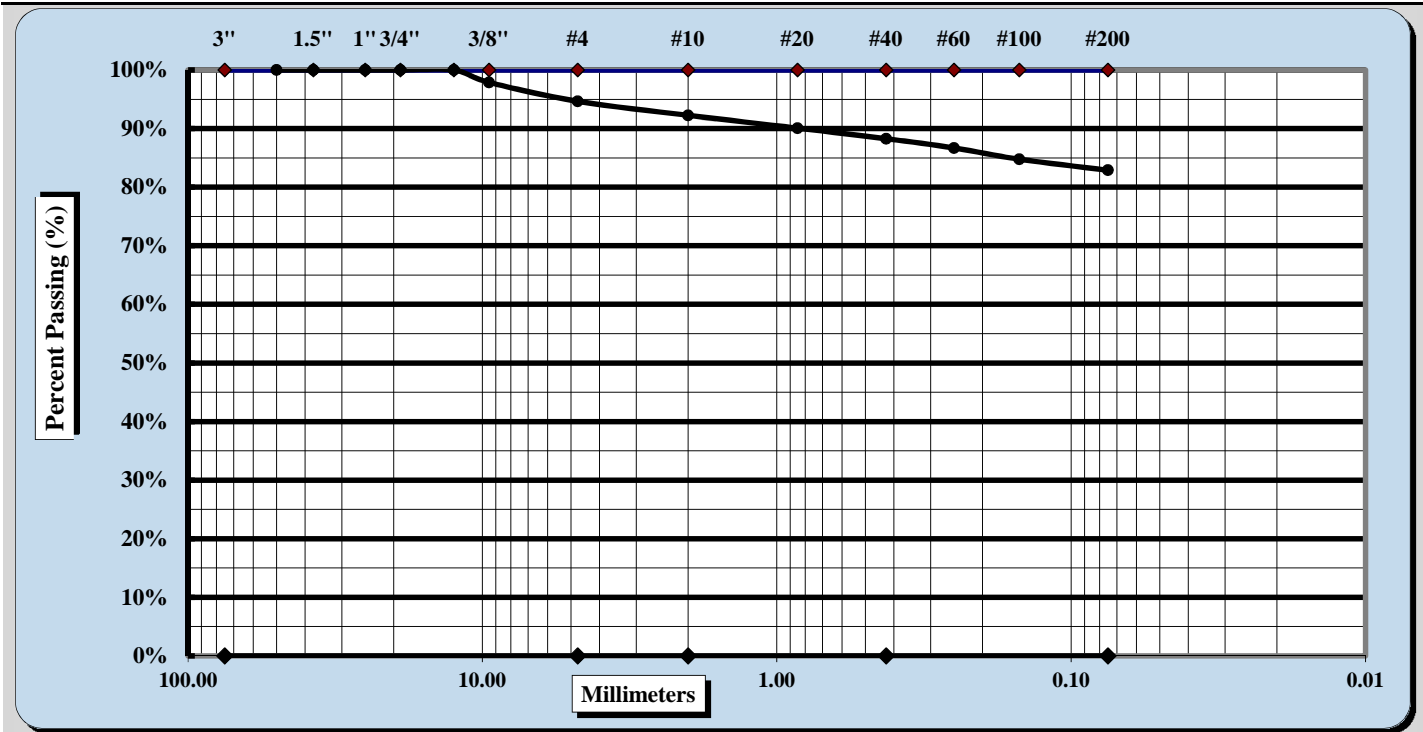


ASTM D 422

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1335-17-037 (01)	Report Date:	12/11/17
Project Name:	West Fork 12 Mile Creek Interceptor	Test Date(s):	11/25-12/11/17
Client Name:	Hazen & Sawyer		
Client Address:	NA		
Sample Id.	B-3	Type:	Split Spoon
		Sample Date:	11/16/17
Location:	Borehole	Sample:	SS-3
		Depth:	6-7.5'

Sample Description: Tan Brown Silty Clay (CH)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	3/8"	Coarse Sand	2.4%	Fine Sand	5.4%
Gravel	5.3%	Medium Sand	4.0%	Silt & Clay	82.9%
Liquid Limit	71	Plastic Limit	24	Plastic Index	47
Specific Gravity	ND			Moisture Content	26.9%
Coarse Sand	2.4%	Medium Sand	4.0%	Fine Sand	5.4%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Nate Bradley
Technical Responsibility

Signature

Staff Professional
Position

1/3/2018
Date

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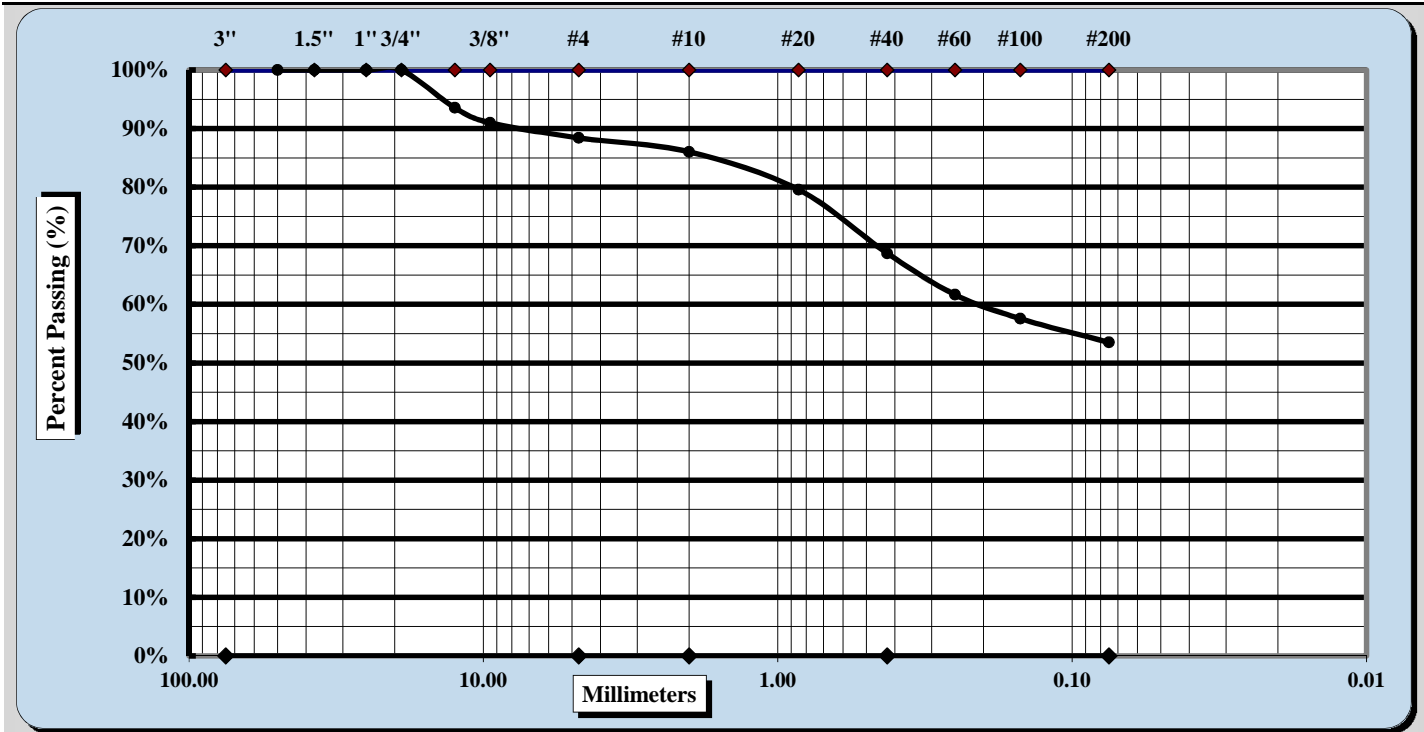


ASTM D 422

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1335-17-037 (01)	Report Date:	12/11/17
Project Name:	West Fork 12 Mile Creek Interceptor	Test Date(s):	11/25-12/11/17
Client Name:	Hazen & Sawyer		
Client Address:	NA		
Sample Id.	B-5	Type:	Split Spoon
		Sample Date:	11/17/17
Location:	Borehole	Sample:	SS-5
		Depth:	13.5-15'

Sample Description: Tan Gray Sandy Clay (CL)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size		Coarse Sand	2.4%	Fine Sand	15.2%
Gravel	11.6%	Medium Sand	17.3%	Silt & Clay	53.5%
Liquid Limit	31	Plastic Limit	22	Plastic Index	9
Specific Gravity	ND			Moisture Content	17.1%
Coarse Sand	2.4%	Medium Sand	17.3%	Fine Sand	15.2%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input checked="" type="checkbox"/>

Notes / Deviations / References:

Nate Bradley
Technical Responsibility

Signature

Staff Professional
Position

1/3/2018
Date

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**UNCONFINED COMPRESSION
(ASTM D7012 Method C)**



S&ME, Inc. - Knoxville 1413 Topside Road, Louisville, TN 37777

Project Name: West Fork 12 Mile Creek Interceptor
Project Number: 1335-17-037, Phase 01

Report Date: December 5, 2017
Reviewed By: Jason B. Burgess

Sample No.	Sample Id	Depth (ft)	Dimensions, in.		Shape (See Key)	Area (in ²)	Unit Weight (lbs/ft ³)	Loading Rate (psi/sec)	Maximum Load (lbs)	Strength (psi)	Moisture (%)
			Length	Diameter							
1	B-6	20.0 - 20.4	4.48	1.98	A	3.08	173.5	100	116,526	37,833	0.0
2	B-6	26.9 - 27.3	4.55	1.98	A	3.08	174.7	90	71,146	23,099	0.0

NOTES: Effective (as received) unit weight as determined by RTH 109-93.
Loading rates were selected to target reaching failure between 2 and 15 minutes.
Test results for specimens not meeting the requirements of ASTM D4543 may differ from a test specimen that meets the requirements of ASTM D4543.

SHAPE KEY

ASTM D4543-08 *Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance* Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this practice is permitted."

- A Test specimen measurements met the desired shape tolerances of ASTM D4543-08 (side straightness, end flatness & parallelism, and end perpendicularity to axis)
- B Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness & parallelism, and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness. Specimen prepared to closest tolerances practicable.
- C Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness & parallelism. Specimen did not meet the desired tolerances for side straightness and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- D Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness. Specimen did not meet the desired tolerances for side straightness, parallelism and end perpendicularity to axis. Specimen prepared to closest tolerances practicable.
- E Test specimen measurements met the desired shape tolerances of ASTM D4543-08 for end flatness and end perpendicularity to axis. Specimen did not meet the desired tolerance for side straightness and parallelism. Specimen prepared to closest tolerances practicable.

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

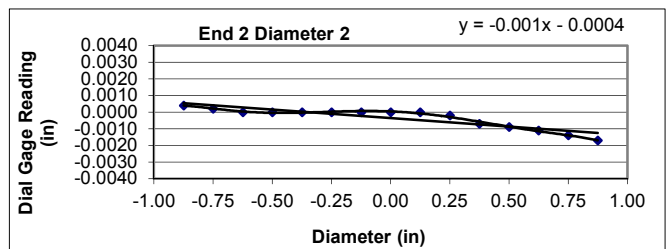
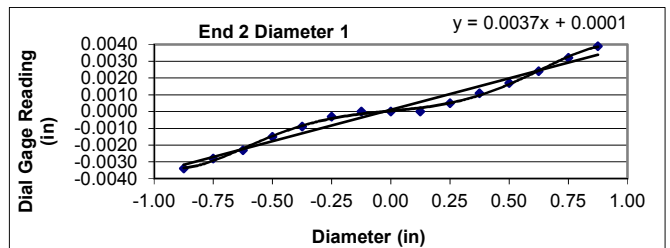
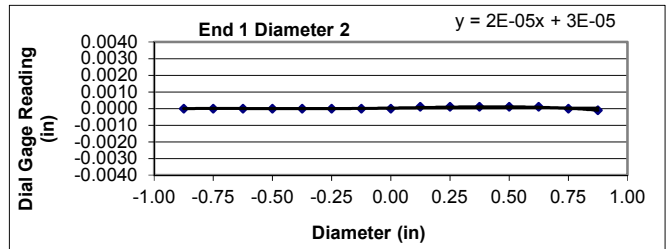
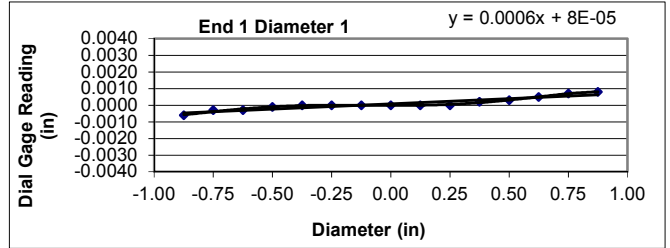
Project: West Fork 12 Mile Creek Interceptor	Diameter (in): 1.98	Date: 12/4/2017
Project No.: 1335-17-037, Phase 01	Length (in): 4.48	Tested by: BKP
Boring Id: B-6	Unit Weight (pcf): 173.5	Reviewed by: JBB
Sample No.: N/A	Moisture Content (%): 0.0	
Depth (ft): 20.0 - 20.4		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	-0.0006	0.0000	-0.0034	0.0004
- 6/8	-0.0003	0.0000	-0.0028	0.0002
- 5/8	-0.0003	0.0000	-0.0023	0.0000
- 4/8	-0.0001	0.0000	-0.0015	0.0000
- 3/8	0.0000	0.0000	-0.0009	0.0000
- 2/8	0.0000	0.0000	-0.0003	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	0.0000	0.0001	0.0000	0.0000
2/8	0.0000	0.0001	0.0005	-0.0002
3/8	0.0002	0.0001	0.0011	-0.0007
4/8	0.0003	0.0001	0.0017	-0.0009
5/8	0.0005	0.0001	0.0024	-0.0011
6/8	0.0007	0.0000	0.0032	-0.0014
7/8	0.0008	-0.0001	0.0039	-0.0017



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	0.00063
	Angle of Best Fit Line:	0.03601
End 2:	Slope of Best Fit Line:	0.00374
	Angle of Best Fit Line:	0.21445
	Max Angular Difference:	-0.18

Parallelism Diameter 2

End 1:	Slope of Best Fit Line:	0.00002
	Angle of Best Fit Line:	0.00131
End 2:	Slope of Best Fit Line:	-0.00103
	Angle of Best Fit Line:	-0.05877
	Max Angular Difference:	0.06

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0014	0.0007	YES
End 1 Diam 2	0.0002	0.0001	YES
End 2 Diam 1	0.0073	0.0037	YES
End 2 Diam 2	0.0021	0.0011	YES

Perpendicularity Tolerance Met? YES

**PREPARING ROCK CORES AS CYLINDRICAL TEST SPECIMENS AND VERIFY
CONFORMANCE OF DIMENSIONAL AND SHAPE TOLERANCES
(ASTM D4543)**



1413 Topside Road, Louisville, TN 37777

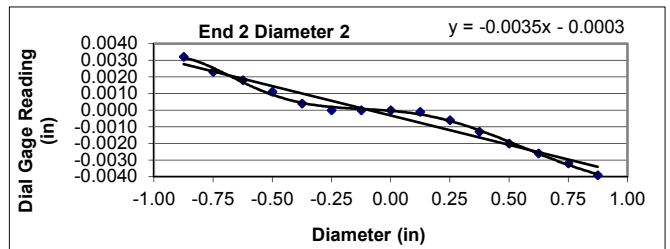
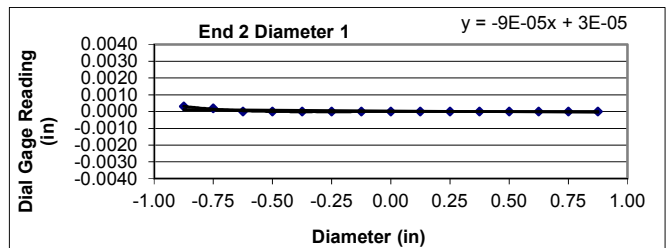
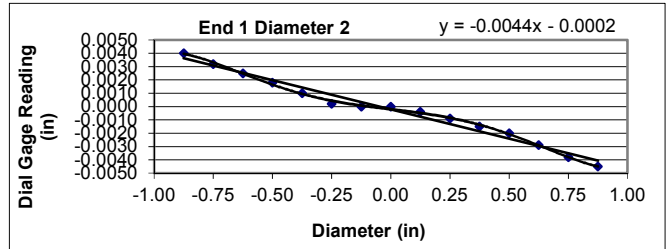
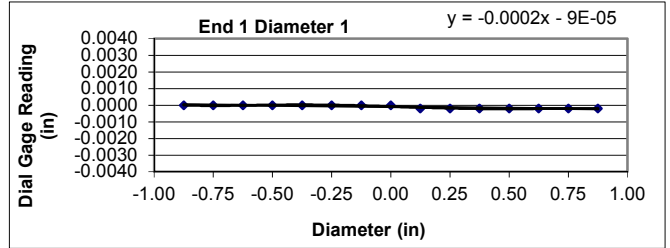
Project: West Fork 12 Mile Creek Interceptor	Diameter (in): 1.98	Date: 12/4/2017
Project No.: 1335-17-037, Phase 01	Length (in): 4.55	Tested by: BKP
Boring Id: B-6	Unit Weight (pcf): 174.7	Reviewed by: JBB
Sample No.: N/A	Moisture Content (%): 0.0	
Depth (ft): 26.9 - 27.3		

Deviation From Straightness (Procedure S1)

Is the maximum gap ≤ 0.02 in.? YES Straightness Tolerance Met? YES

End Flatness and Parallelism Readings (Procedure FP1)

Position	End 1	End 1(90)	End 2	End 2(90)
- 7/8	0.0000	0.0040	0.0003	0.0032
- 6/8	0.0000	0.0032	0.0002	0.0023
- 5/8	0.0000	0.0025	0.0000	0.0018
- 4/8	0.0000	0.0018	0.0000	0.0011
- 3/8	0.0000	0.0010	0.0000	0.0004
- 2/8	0.0000	0.0002	0.0000	0.0000
- 1/8	0.0000	0.0000	0.0000	0.0000
0	0.0000	0.0000	0.0000	0.0000
1/8	-0.0002	-0.0004	0.0000	-0.0001
2/8	-0.0002	-0.0009	0.0000	-0.0006
3/8	-0.0002	-0.0015	0.0000	-0.0013
4/8	-0.0002	-0.0020	0.0000	-0.0020
5/8	-0.0002	-0.0029	0.0000	-0.0026
6/8	-0.0002	-0.0038	0.0000	-0.0032
7/8	-0.0002	-0.0045	0.0000	-0.0039



Flatness is met when the difference at any point between a smooth curve drawn through points and a visual best fit line is ≤ 0.001 in.

Flatness Tolerance Met? YES

Parallelism is met when the angular difference between best fit lines on opposing ends is $\leq 0.25^\circ$.

Parallelism Diameter 1

End 1:	Slope of Best Fit Line:	-0.00016
	Angle of Best Fit Line:	-0.00917
End 2:	Slope of Best Fit Line:	-0.00009
	Angle of Best Fit Line:	-0.00540
	Max Angular Difference:	0.00

Parallelism Diameter 2

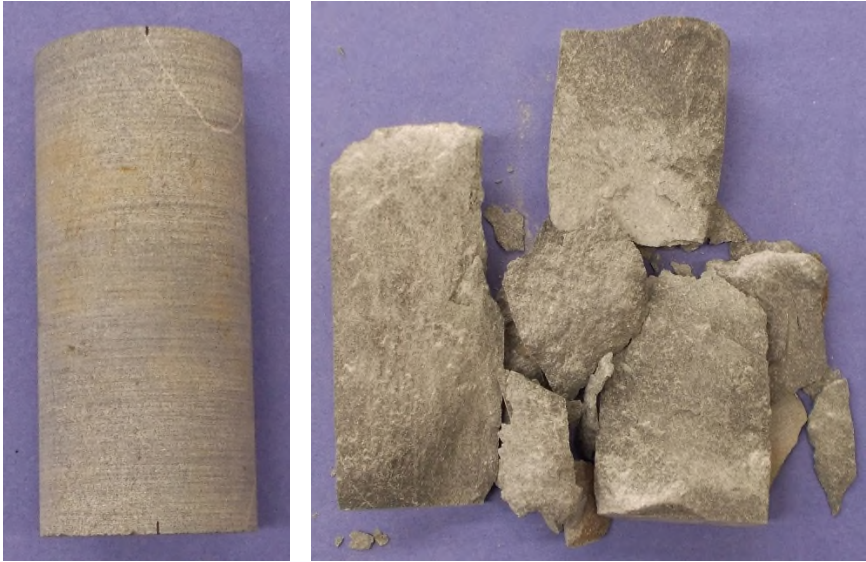
End 1:	Slope of Best Fit Line:	-0.00439
	Angle of Best Fit Line:	-0.25177
End 2:	Slope of Best Fit Line:	-0.00353
	Angle of Best Fit Line:	-0.20217
	Max Angular Difference:	-0.05

Parallelism Tolerance Met? YES

Perpendicularity (Procedure P1) is met when the difference between max and min readings along each line divided by the diameter is ≤ 0.0043 .

	Difference b/w max & min	Divide by Diameter	Meets Tolerance
End 1 Diam 1	0.0002	0.0001	YES
End 1 Diam 2	0.0085	0.0043	YES
End 2 Diam 1	0.0003	0.0002	YES
End 2 Diam 2	0.0071	0.0036	YES

Perpendicularity Tolerance Met? YES

		Date: 12/4/2017
		Photographer: Ben Painter
1	Location / Orientation	B-6 (20.0' – 20.4')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C)

		Date: 12/4/2017
		Photographer: Ben Painter
2	Location / Orientation	B-6 (26.9' – 27.3')
	Remarks	Unconfined Compressive Strength of Rock Core Specimen Before/After (ASTM D7012 Method C)



June 7, 2018

Hazen and Sawyer
9101 Southern Pine Boulevard, Suite 250
Charlotte, North Carolina 28273

Attention: Mr. Jeff Greene

Reference: **Subsurface Exploration – Addendum 1**
West Fork Twelve Mile Creek Interceptor
Union County, North Carolina
S&ME Project No. 1335-17-037
NC PE Firm License No. F-0176

Dear Mr. Greene:

S&ME, Inc. (S&ME) has completed the additional laboratory testing for the above-referenced project. These services were performed in general accordance with the *Subcontract Agreement for Professional Services between Hazen & Sawyer and S&ME, Inc. for West Fork Twelve Mile Creek Interceptor* dated July 7, 2017.

◆ Project Information

S&ME has been providing geotechnical services for the new 24-inch diameter interceptor that generally parallels West Fork Twelve Mile Creek in Union County, North Carolina. S&ME issued a *Report of Subsurface Exploration*, dated January 16, 2018. In May 2018, Hazen and Sawyer requested additional laboratory testing to estimate the corrosion potential of the soils at the road crossings.

◆ Laboratory Testing

S&ME submitted splitspoon samples of soil gathered during the subsurface exploration for laboratory testing. The samples submitted were taken at the depth of the proposed sewer line at the Beulah Church Road and Forest Lawn Drive crossings. There was not enough sample material to test for the Antioch Church Road crossing due to the density of the soil/rock at that location.

Crossing	Boring Numbers
Antioch Church Road	B-1, B-2 (not tested)
Beulah Church Road	B-3, B-4
Forest Lawn Drive	B-5, B-6



The soil samples were tested for Redox Potential, pH, Chloride, Sulfates, and Resistivity and the results are attached. Based on several industry sources (summary attached), the laboratory tests do not indicate a potential for a corrosive environment.

Test	Results	Corrosion Potential
Redox (ORP)	188.7 - 353.3 mV	Negligible
pH	5.06 – 7.99	Non Corrosive
Chloride Ions	<31 ppm	Negligible
Sulfate Ions	<50-70 ppm	Negligible
Resistivity	15,1000-18,500 ohm-cm	Negligible

◆ Limitations

The additional information presented in this addendum is intended to supplement those presented in the previously submitted Report. Accordingly, this addendum letter report should be reviewed in conjunction with the *Report of Subsurface Exploration* dated January 16, 2018.

This addendum letter report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

◆ Closure

S&ME appreciates the opportunity to assist you during this phase of the project. If you should have any questions concerning this addendum or if we may be of further assistance, please contact us.

Sincerely,

S&ME, Inc.

Kristen H. Hill, P.E., P.G.
Principal Geotechnical Engineer
NC Registration No. 29147



Luis A. Campos, P.E.
Geotechnical Group Leader

Soil Test Evaluation for Ductile Iron Pipe (10-Point System)* - by CIPRA 1964.

ANSI/AWWA C105/A21.5 Standard

From Ductile Iron Pipe Research Association's "Polyethylene Encasement" - © 2004

Soil Characteristics	Points	Soil Characteristics	Points
Resistivity (ohm-cm)**		Redox Potential	
<1,500	10	>+100 mV	0
≥1,500 - 1,800	8	+50 to +100 mV	3.5
>1,800 - 2,100	5	0 to +50 mV	4
>2,100 - 2,500	2	Negative	5
>2,500 - 3,000	1		
>3,000	0	Sulfides	
		Positive	3.5
pH		Trace	2
0 - 2	5	Negative	0
2 - 4	3		
4 - 6.5	0	Moisture	
6.5 - 7.5	0***	Poor drainage, continuously wet	2
7.5 - 8.5	0	Fair drainage, generally moist	1
> 8.5	3	Good drainage, generally dry	0
Redox Potential			
>+100 mV	0		
+50 to +100 mV	3.5		
0 to +50 mV	4		
Negative	5		

* Ten points - soil corrosive to ductile iron pipe. Protection is indicated.

** Based on water-saturated soil box. This method is designed to obtain the lowest and most accurate resistivity reading.




*** If sulfides are present and low (<100 mV) or negative redox potential results are obtained. 3 points should be given for this range.

Note: DIPRA recommends that soil samples used in the 10-point evaluation be taken at pipe depth rather than at the surface. Soil corrosivity readings can vary substantially from the surface to pipe depth.





The following is a summary of several industry texts and/or guidance document opinions with respect to soil analytical data, and the respective corrosive concerns with various constituents.

Per Peabody's Control of Pipeline Corrosion - Second Edition



Soil Resistivity

	0 - 500	Very Corrosive
	500 - 1,000	Corrosive
	1,000 - 2,000	Moderately Corrosive
	2,000 - 10,000	Mildly Corrosive
	>10,000	Negligibly Corrosive





Chloride Ion Concentration

	< 500	Threshold
	500 - 1,500	Corrosive
	1,500 - 5,000	Considerable
	> 5,000	Severe

pH

	< 5.5	Severely Corrosive
	5.5 - 6.5	Moderately Corrosive
	6.5 - 7.5	Neutral
	>7.5	None (alkaline) to ferrous metals

Sulfate Ion Concentration

	0 - 150	Negligible
	150 - 1,500	Positive
	1,500 - 10,000	Considerable
	>10,000	Severe

Moisture content >20% is considered high, and more conducive to corrosion.

Any detectable concentrations of sulfides are indicative of anaerobic conditions that may support high rates of metal dissolution due to microbiology induced corrosion.

Per National Academy of Sciences - Review of the Bureau of Reclamation's Corrosion Prevention Standards for Ductile Iron Pipe - 2009

The Bureau of Reclamation defines "highly corrosive soils" as any soil with a soil resistivity of 2,000 ohm-cm or less.

It is also noted within this document that there is no consensus within the pipeline community to define what are "highly corrosive soils".

Per Caltrans Corrosion Guidelines - Version 1.0 September 2003

For structural elements, the Department considers a site to be corrosive if one or more of the following conditions exist for the representative soil and/or water samples taken at the site.

Chloride concentration is 500 ppm or greater, sulfate concentration is 2,000 ppm or greater, or the pH is 5.5 or less.

SECTION 01011

SURVEYS AND LAYOUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Prior to construction, the Engineer will provide the Contractor survey control points and centerline of gravity sewer and associated manholes in AutoCAD format.
- B. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings. Elevation of existing ground and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake out survey shall be referred immediately to the Engineer for interpretation or correction.
- C. All survey work for construction control purposes shall be made by the Contractor at his expense. The Contractor shall provide a Licensed Surveyor as Chief of Party, competently qualified men, all necessary instruments, stakes, and other material to perform the work.
- D. Contractor shall establish all baselines for the location of the principal component parts of the work together with a suitable number of temporary bench marks as required to perform the work. Based upon the information provided by the Contract Drawings, the Contractor shall develop and make all detail surveys necessary for construction.
- E. The Contractor shall be responsible for protecting these until construction is complete. All other construction layout and surveying, which may be required for construction, shall be provided by the Contractor and any costs associated shall be included in the various pay items of the BID FORM. The Contractor is responsible for determining the amount of additional construction layout and surveying that may be required to complete construction.
- F. Contractor shall stake the alignment of the entire proposed pipeline corridor to facilitate clearing and grubbing, installation of sedimentation and control devices, establish limits of construction, etc. prior to installation of any pipe and associated manholes. Owner/Engineer shall be afforded the opportunity to review the proposed pipeline alignment prior to installation of any pipe and associated manholes.

1.02 INFORMATION PROVIDED TO THE CONTRACTOR

- A. The Engineer will furnish the Contractor dimensioned plans (Drawings) showing the location of the proposed pipeline(s) and appurtenances to be constructed under this Contract. The locations of the new facilities are based upon a combination aerial/ground survey and it is possible that some of the original control points are in place although no expressed or implied warranty is given as to the presence or correctness of any of these points.
- B. All elevations refer to the mean sea level datum as established by U.S. Geological Survey.

- C. Elevation of existing ground, structures, and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Contractor shall field verify location and depths of existing utilities at least 1000 feet ahead of pipe laying operations. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake-out survey shall be referred immediately to the Engineer for interpretation or correctness.
- D. The Contractor shall locate existing utilities far enough ahead of his work, so he may make minor adjustments to the proposed pipeline alignment, far enough in advance to allow enough room to avoid conflicts with existing utilities. All adjustments shall be approved by the Engineer prior to the work.

1.03 LAYOUT WORK

- A. Vertical alignment changes, if required by utility conflicts, will be made only at manholes and with Engineer's approval.
- B. Horizontal alignment changes will require new manholes and will only be made with the direct approval of the Engineer.
- C. The Engineer and Owner shall not make payment for damages or for construction incorrectly performed because of errors made by the Engineer in giving line and grade, when the errors could have been detected by using normal and careful construction practices. Nor shall the Owner or Engineer make payment because of any errors in giving line and grade in the absence of notice to the Engineer of such errors. In addition, the Contractor shall have on site necessary survey instruments with which to check horizontal and vertical alignment. Contractor shall be responsible for providing cut stakes as necessary to install the gravity sewer.
- D. Prior to and throughout construction, the Contractor (accompanied by the Construction Observer) shall locate and flag all monuments, corners, etc., which in any way may be affected by construction. The Contractor shall then protect, or re-establish all the above disturbed by any act pursuant to this construction. Said corners and/or monuments shall be replaced by the Contractor's surveyor at the Contractor's expense.
- E. Normal and careful construction practices for construction of the gravity sewer line shall include setting a laser for laying pipe, using carpenter's level or a string level to check the direction of flow of the pipe, sighting down forms that are set in place to check uniformity, and using a carpenter's level to check walls, piers and structures to determine if they are plumb.
- F. The Contractor shall exercise special care of pipe alignment where future connections are indicated to insure that future connections can be made without major alterations and realignments.
- G. At the completion of the work, the Contractor shall furnish one complete set of Record Drawings indicating the final location of all structures, piping, existing utilities crossed, property lines, new roads and pavements, curbs, drainage ditches, etc. The Record Drawings shall also show the size and elevation of all piping, finished grades, and elevation of all structures.

1.04 CHECKING BY THE ENGINEER

- A. The Engineer may check all or any portion of the layout work, at any time during construction. The Contractor shall afford all necessary assistance to the Engineer in carrying out such checks. Any necessary corrections to the work shall be immediately made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

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SECTION 01012

SPECIAL PROVISIONS

PART 1 -- GENERAL

1.01 PROJECT SPECIAL PROVISIONS

The Special Provisions, as delineated below and contained within this Section 01012, shall be considered a part of this Contract and fully complied with by the General Contractor. In the event any provision of this Section modifies, differs, or contradicts a provision contained elsewhere in this document, the provisions of this Section shall control.

All work required to comply with these Special Provisions shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the unit prices bid. No direct or separate payment will be made for these Special Provisions.

1.02 UTILITY COORDINATION

The following utilities are known to own and maintain underground utilities in Union County and are to be contacted by the Contractor to confirm underground utilities prior to construction:

Duke Energy	Sprint
NC Department of Transportation	AT&T
Piedmont Natural Gas	Google Fiber
Verizon Wireless	

Other utilities may be shown on the construction plans that are not listed above. The Contractor shall adhere to the provisions of the 1985 Underground Damage Prevention Act, North Carolina Statutes 887, Chapter 785, Senate Bill 169, Article 3. To assist the Contractor in meeting the requirements of this law, there is a "one call system" called "NC ONE-CALL" which can be reached at 1-800-632-4949 or by dialing 811. For calls originating outside of North Carolina, the number is 1-919-855-5760. The Contractor shall include the cost of any coordination and cooperation of utilities in his bid. It will be the Contractor's responsibility to contact NC ONE-CALL and/or these utility companies for locations of their existing utilities. No additional compensation shall be allowed for delays or inconvenience sustained by the Contractor due to utility relocation or adjustments. No additional payment will be made for remobilization required by the utility's failure to relocate a utility at the request of the Contractor.

Where changes to utility facilities are made solely for the convenience of the Contractor, it shall be the Contractor's responsibility to arrange for such changes, and the Contractor shall bear all costs of such changes.

1.03 FLOOD PROTECTION

The majority of the work associated with the West Fork Twelve-Mile Creek Interceptor project is within the 100-year floodplain. The Contractor will be responsible for taking all precautions necessary to protect the proposed gravity sewers from flood, flotation, and

debris, including, but not limited to, installation of watertight plugs placed at appropriate intervals and protection/sealing of new open manholes to minimize flood waters from entering the existing gravity sewers. Open ends of pipe shall be plugged (watertight) at night. Bypass pumping set up and operation, storage of materials and supplies, and other operations should be considered when working within the 100-year floodplain area.

1.04 DUKE ENERGY EASEMENT REQUIREMENTS

Portions of the West Fork Twelve-Mile Creek Interceptor project parallel and/or cross Duke Energy existing easements. The Owner has or will make all necessary arrangements with the various utilities to protect lines and the public. Union County and the Contractor shall adhere to the provisions of "ARTICLE 19A - OVERHEAD HIGH-VOLTAGE LINE SAFETY ACT - State Statute 95-229", as amended and became effective January 1, 1999.

DUKE ENERGY ELECTRIC TRANSMISSION RIGHTS-OF WAY
GUIDELINES/RESTRICTIONS
VALID FOR
NORTH CAROLINA AND SOUTH CAROLINA

This list of rights-of-way restrictions has been developed to answer the most frequently asked questions about property owner use of Duke Energy's electric transmission rights of way. This list does not cover all restrictions or all possible situations. You should contact the Asset Protection Right-of-Way Specialist if you have additional concerns about the rights of way. This list of restrictions is subject to change at any time and without notice. Duke Energy reserves all rights conveyed to it by the right-of-way agreement applicable to the subject property. All activity within the rights of way shall be reviewed by an Asset Protection Right-of-Way Specialist to obtain prior written approval. Engineering plans may be required. Compliance with the Duke Energy Right-of-Way Guidelines/Restrictions or approval of any plans by Duke Energy does not mean that the requirements of any local, county, state, or federal government or other applicable agency with governing authority have been satisfied.

1. Structures, buildings, manufactured/mobile homes, satellite systems, swimming pools (any associated equipment and decking), graves, billboards, dumpsters, signs, wells, deer stands, retaining walls, septic systems or tanks (whether above or below ground), debris of any type, flammable material, building material, wrecked or disabled vehicles and all other objects (whether above or below ground) which, in Duke Energy's opinion interferes with the electric transmission right of way, are not allowed within the right-of-way limits. Transformers, telephone/cable pedestals (and associated equipment), and fire hydrants are not allowed. Manholes, water valves, water meters, backflow preventers and irrigation heads are not permitted. Attachments to Duke Energy structures are prohibited.
2. Fences and gates shall not exceed 10 feet in height and shall be installed greater than 25 feet from poles, towers and guy anchors. Fences shall not parallel the centerline within the rights of way but may cross from one side to the other at any angle not less than 30 degrees with the centerline. If a fence crosses the rights of way, a gate (16 foot wide at each crossing) shall be installed by the property owner, per Duke Energy's specifications. The property owner is required to install a Duke lock on the gate to insure access. Duke will supply a lock.
3. Grading (cuts or fill) shall be no closer than 25 feet from poles, towers, guys and anchors (except for parking areas, see paragraph 7) and the slope shall not exceed

4:1. Grading or filling near Duke Energy facilities, which will prevent free equipment access, or creates ground to conductor clearance violations, will not be permitted. Storage or stockpiling of dirt or any other material is prohibited. Sedimentation control, including re-vegetation, is required per state regulations.

4. Streets, roads, driveways, sewer/water lines, other utility lines or any underground facilities shall not parallel the centerline within the rights of way, but may cross, from one side to the other, at any angle not less than 30 degrees with the centerline. No portion of such facility or corresponding easement shall be located within 25 feet of Duke Energy's facilities. Roundabouts, cull- de-sacs, intersections (roads, driveways and alleyways) are not permitted.
5. Any drainage feature that allows water to pond, causes erosion, directs storm water toward the rights of way, or limits access to or around Duke Energy facilities is prohibited.
6. Contact Duke Energy prior to the construction of lakes, ponds, retention, or detention facilities, etc.
7. Parking may be permitted within the rights of way, provided that:
 - a. Prior to grading, concrete barriers shall be installed at a minimum of 9 feet from the Duke Energy facilities. During construction, grading shall be no closer than 10 feet to any Duke Energy facility.
 - b. After grading/paving activity is complete, Duke Energy approved barrier, sufficient to withstand a 15 mph vehicular impact, shall be erected 9 ft. from any Duke Energy facility.
 - c. Any access areas, entrances, or exits shall cross (from one side to the other) the right of way at any angle not less than 30 degrees with the centerline, and shall not pass within 25 feet of any structure. Parking lot entrances/exits cannot create an intersection within the right of way.
 - d. Lighting within the rights-of-way limits must be approved by Duke Energy before installing. Due to engineering design standards, lighting is not allowed in the "Wire Zone". Where lighting is approved (Border Zone), the total height may not exceed 15 ft. in Area A and 12 feet in Area B. See map on back of this page for Areas. Contact your Asset Protection Specialist as the "Wire Zone" varies for the different voltage lines.
8. Duke Energy will not object to certain vegetation plantings as long as:
 - a. It does not interfere with the access to or the safe, reliable operation and maintenance of Duke Facilities.
 - b. With prior written approval, Duke Energy does not object to low growing shrubs and grasses within the "Wire Zone". Tree species are not allowed within the "Wire Zone". Trees that are approved in the border zone may not exceed, at maturity, 15 ft. in Area A and 12 feet in Area B. See map on back of page for Areas. Contact your Asset Protection Specialist as the "Wire Zone" varies for the different voltage lines.

- c. Engineering drawings must indicate the lowest conductors.
 - d. Vegetation that is not in compliance is subject to removal without notice.
 - e. Duke Energy may exercise the right to cut "danger trees" outside the rights of way limits as required to properly maintain and operate the transmission line.
9. Refer to Duke Energy Transmission Conditional Approval Letter in Appendix A for additional requirements.

1.05 DUKE ENERGY BLASTING RESTRICTIONS

Portions of the West Fork Twelve-Mile Creek Interceptor project parallel and/or cross under Duke Energy's high voltage transmission mains. As a result, blasting is prohibitive per the guidelines outlined in the subsequent paragraphs and/or as indicated on the Drawings.

DUKE ENERGY TRANSMISSION ENGINEERING GUIDELINE FOR ROCK EXCAVATION ON TRANSMISSION LINE RIGHTS OF WAY AND FEE OWNED PROPERTY

It is the desire of Duke Energy to keep all personnel safe while working under energized power lines. No blasting plan will be authorized if Duke Energy determines that the work cannot be completed safely. It is also the desire of Duke Energy to keep all assets for the transmission of electrical power free from damage and operating at its full available capacity at all times before, during and after any work or excavation that is allowed to occur within any transmission line right of way. The purpose of the transmission line is the transmission of electricity and the purpose of the right of way is to protect the facilities within the right of way. This guideline will assist with the understanding of what Duke Energy may allow within the right of way regarding rock excavation. This document is a guideline and a Blasting License Agreement is required to be executed before any work may take place. Please note that a Blasting License Agreement is not guaranteed, even if the blasting plan meets the guidelines herein.

Other factors may give cause for Duke Energy to deny the use of blasting as a method of rock removal. Safety, operational and risk parameters of Duke Energy's transmission system will be the main priority and determining factors for approval of the blasting plan. For example: critical lines out of Nuclear plant facilities that have large financial implications for the customers of Duke Energy may not justify execution of a Blasting License Agreement. At any time, Duke Energy may request that all work be stopped within the right of way due to any need of Duke Energy.

Below are engineering guidelines for use while evaluating a contractors blasting plan for rock excavation within Duke Energy Transmission Line Right of Ways.

1. A blasting plan must be submitted by the entity that will perform the blasting work. A Blasting License Agreement which is a legally binding document will be entered into by the blasting company and Duke Energy. This is the approval mechanism for any blasting work that will take place in Duke Energy right of way or fee owned property.
2. A minimum of two weeks will be required for Duke Energy to evaluate and either

approve or deny a blasting plan. A large blasting plan may take longer. The blasting plan should include the following at a minimum:

- a. Dates and times of when blasting will be performed. Duke Energy reserves the right to exclude blasting during times of high load and near critical facilities where interruption to power flow would cause undue liability for Duke Energy, its customers and others deemed appropriate by Duke Energy.
 - b. The blasting plan should include a scaled drawing of the zone of the work, Duke Energy structure number(s), right of way width's, blast exclusion zones (see bullet item below).
 - c. The blasting company should provide evidence of being licensed in the state of operation, bonded, insured and comply with all Federal, State and Local regulations, statues and laws.
3. Duke Energy reserves the right to have an inspector present during all blasting operations. The cost will be the responsibility of the blasting contractor.
 4. Blasting material and detonation devices shall not be stored on Duke Energy right of way or fee owned property. No blasting media or detonation devices shall be allowed on Duke Energy right of way or fee owned property until such time that all the bore holes are ready to charge.
 5. Detonation of blast should be performed outside of Duke Energy right of way or fee owned property.
 6. All charge detonation lines shall be controlled such that no premature detonation can be caused due the presence of electrical fields within the transmission line right of way.
 7. Adequate protection against fly rock should be used to prevent any damage to transmission facilities. This may include blasting mats and or stemming. No soil, rock, debris or materials shall be propelled above the ground as a result of blasting.
 8. The following blast exclusion zone shall be maintained at all times. Blasting will not be allowed for the following:
 - a. No closer than 150' away from any structure or down guy with a voltage of 500kV or higher.
 - b. No closer than 75' away from any structure or down guy with a voltage between 345kV to 230kV.
 - c. No closer than 50' away from any structure or down guy with a voltage between 200kV to 44kV.
 - d. No closer than 100' away from any angle structure.
 - e. Lattice towers require that distances above be measured from the nearest structure leg as opposed to the center of the structure.
 9. All blasting exclusion zones shall be clearly marked in the field to ensure that

blasting is prohibited in the blast exclusion zone by the mining operator. Failure to do so will result in an immediate revocation of any blasting licensing agreement.

10. The maximum particle velocity for any blast shot shall not exceed 2.0 in/sec as measured at the base of the nearest structure to the blast zone.
 - a. All blasting within 700' of any structure shall be monitored with seismographs to ensure compliance with the stated conditions or as directed by the structural engineer. Results from the recorded readings will be used by the blasting company to determine whether the blasting plan shall be revised to meet the requirements listed.
 - b. Where possible all measures to mitigate particle velocity at the structure shall be utilized. This should include drilling extra bore holes at the radius of the exclusion zone.
11. All equipment shall meet the minimum required OSHA electrical clearances with the transmission conductor based on line voltage. Duke Energy will provide the line voltage to the contractor. It is the responsibility of the contractor to have field personnel trained in this area and to monitor actual conditions in the field.
12. Duke Energy shall be notified 3 business days prior to any authorized blasting on the transmission line right of way.
13. Refer to Duke Energy Transmission Conditional Approval Letter in Appendix A for additional requirements.

1.06 CONCRETE WASHOUT STRUCTURE

Concrete washout structures are enclosures above or below grade to contain concrete waste water and associated concrete mix from washing out ready-mix trucks, drums, pumps, or other equipment. Concrete washouts must collect and retain all the concrete washout water and solids, so that this material does not migrate to surface waters or into the ground water. These enclosures are not intended for concrete waste not associated with wash out operations.

The concrete washout structure may include constructed devices above or below ground and or commercially available devices designed specifically to capture concrete waste water.

1.07 WESLEY CHAPEL WEDDINGTON ATHLETIC ASSOCIATION AND WEDDINGTON OPTIMIST CLUB

Work or activity at the Wesley Chapel Weddington Athletic Association and the Weddington Optimist Club of Waxhaw shall have the following restrictions:

- Prior to performing any work in and adjacent to the above referenced parcels, the Contractor shall contact George Sella at (704) 309-7642 or via email at greenview@windstream.net.

- Work, as shown on Drawings C25 and C26, shall only be performed between November 15th through February 28th unless allowed by the Athletic Association / Optimist Club.

1.08 NCDOT DRIVEWAY PERMIT

Refer to the NCDOT Driveway Permit in Appendix A for requirements and stipulations. Of special interest, please note the following:

- Permit only valid for one (1) year from the date of issuance (August 2, 2018). Contractor shall be responsible for coordinating extension of the Permit with NCDOT in accordance with the construction schedule.
- Contractor is responsible for notifying District Engineer 48 hours prior to installation of all temporary construction entrances and afterwards so that an inspection can be conducted by the NCDOT.
- Any lane closures on Antioch Church Road, Beulah Church Road, and Forest Lawn Drive shall only occur between the hours of 9:00 am and 4:00 pm.

1.09 OCCUPANCY OF OR INTRUSIONS ONTO PRIVATE PROPERTY

Contractor is allowed to enter into agreements with Property Owners for temporary work, disposal of materials, and/or access privileges. Such agreements must be in writing, and a copy of any such agreement shall be provided to the County in advance of any use or occupancy of private property. The terms of these agreements shall clearly express to the Property Owner that the Contractor is seeking such use, occupancy, or access independently from Union County and its Contract with Union County, and that the Contractor will be solely responsible for activities carried out on such areas. Accordingly, the Contractor shall be solely responsible for such actions and hereby agrees to hold harmless and indemnify Union County and Hazen and Sawyer from all actions, claims, liabilities, including the payment of attorney's fees, arising from such actions.

- 1.10 Contractor shall provide and adhere to the specific Property Owners' terms, conditions, and requirements as delineated and noted in the Drawings.

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SECTION 01015

PERMITS AND AGREEMENTS

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

- A. The Contractor shall obtain and pay for any and all permits and licenses as provided for in the General Conditions and as stipulated herein.
- B. The Contractor shall schedule all inspections and obtain all written approvals of the agencies required by the permits and licenses.
- C. The Contractor shall comply with all construction-related conditions specified in each of the permits, encroachment agreements, easement agreements, and licenses obtained by the Contractor and Owner.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 PERMIT AND AGREEMENT CONDITIONS

- A. The Contractor shall adhere to the stipulations of the respective permits, in addition to the Drawings and Specifications.
- B. Nothing in said permits, encroachment agreements, and easement agreements shall serve to decrease or negate the requirements of the Bidding Documents.

3.02 PERMITS, PERMIT APPLICATIONS, AND APPROVALS

- A. The following permits are included in Appendix A:
 - US Army Corps of Engineers Nationwide Permit 12
 - NCDEQ Sedimentation and Erosion Control Permit
 - NCDOT Encroachment Contract
 - NCDOT Driveway Permit
 - NCDEQ 401 Water Quality Certification
 - Duke Energy Transmission Conditional Approval Letter
 - Duke Energy Extended LONO

- NCDEQ Fast-Track Wastewater Collection Permit
- Weddington Flood Study Permit

- END OF SECTION -

SECTION 01025

PAYMENT ITEM DESCRIPTIONS

PART 1 -- GENERAL

1.01 SCOPE OF WORK

- A. The items listed below refer to and are the same pay items listed in the Bid Form. All costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit prices bid. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the prices bid. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, services, layout surveys, testing, sanitary requirements, safety devices, shop drawing submittals and record drawings, water supplies, power and fuel, removal of waste, storage and protection, and other requirements of the Contract.
- B. Each lump sum and unit bid price will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's overhead and profit for each separately identified item.

1.02 ENGINEER'S ESTIMATE OF QUANTITIES

- A. The Engineer's estimated quantities for unit price pay items, as listed in the Bid Form, are approximate and are included solely for the purpose of comparison of Bids. The Owner does not expressly or by implication agree that the nature of the Work encountered or the actual quantities of material required will correspond therewith and reserves the right to increase or decrease any quantity or to eliminate any quantity as the Owner may deem necessary. The basis of payment for work and materials will be the actual amount of work done and materials furnished. Contractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts thereof.

1.03 CONTINGENCY ALLOWANCE

- A. The Contingency Allowance is to provide payment for unseen conditions which may be encountered in the Work and is to be used only upon a Written Amendment, a Written Change Order, or a Written Work Change Directive from the Engineer. Any unused portion of the allowance remaining at the completion of the Contract shall revert back to the Owner as a credit.

1.04 PAYMENT ITEM DESCRIPTIONS

PAY ITEM A – Furnish and Install New Pipe

Payment for this item includes all labor, equipment, and materials for installing and placing into successful operation new piping with indicated joints and size as shown on the Contract Drawings. This payment item also includes the following work items:

- All field survey, excavation, dewatering, trenching, temporary fencing, and backfill for new pipe installation.
- Installation of anti-seepage collars per Detail 0260113 where indicated on the Drawings.
- Class B Bedding (per Detail UC-8 for all pipe within the FEMA 100 Yr Base Flood Elevation and for all pipe greater than 12-inches in diameter), and Class C Bedding (per Detail UC-8A for all pipe less than 12-inches in diameter which is installed outside the FEMA 100 Yr Base Flood Elevation).
- All utility location and soft digs as required.
- All testing of new pipe per the Specifications.
- Stockpile and re-install top soil in landscaped areas and restoration of all disturbed areas.
- Restrained joint ductile iron piping as shown on the Contract Drawings and specified.
- Push-on ductile iron, and/or PVC gravity sewer pipe as shown on the Contract Drawings and specified.
- Proper protection and/or bracing as required for all above and below ground utility conflicts (e.g., gas line, storm drains, water mains, telecommunication cables/ductbanks, power poles, etc.) within the working limits of the new pipe/manhole installation as shown on the Contract Drawings and/or as stipulated in the Specifications.
- Constructing and maintaining all temporary access easements to the project site.
- Installation of polywrap per Section 15006 where indicated on the Drawings and Specifications.
- All work as stipulated within the Special Provisions (Section 01012) and the individual Property Owner's requirements as noted on the Drawings.

Payment shall be made on a linear foot basis measured on a horizontal plane to the center of each manhole/structure following completion of installation, and include all necessary work required that is not specifically indicated in other bid items.

PAY ITEM B – Furnish and Install New Manholes

Payment for this item includes all labor, equipment, and materials for installing and placing into successful operation new manholes of the depth and size as shown on the Contract Drawings. This payment item also includes the following work items:

- All field survey, excavation, dewatering, backfill and shoring for new manhole installation.
- All utility location and soft digs as required.
- All testing of new manholes per the Specifications.
- Stockpile and re-install top soil in landscaped areas and restoration of all disturbed areas.
- Proper protection and/or bracing as required for all above and below ground utility conflicts (e.g., gas line, storm drains, water mains, telecommunication cables/ductbanks, power poles, etc.) within the working limits of the new manhole installation as shown on the Contract Drawings and/or as stipulated in the Specifications.
- All rings, covers, drop piping, vents, boots, sealants, and other manhole appurtenances as specified and required.

- Payment for this item shall also include coating all manhole vent pipes as specified in Section 09900, and drop manholes as shown and detailed on the Drawings.

Payment will be made on a unit price basis per manhole diameter as indicated in the Bid Form.

PAY ITEM C – Guaranteed Bored/Tunneled Crossings

Payment for this item includes furnishing all material, labor, and appurtenances for the guaranteed jack and bore/tunnel installation including: mobilization, dewatering, jacking pit, receiving pit, any and all shoring required, rock removal and disposal, casing pipe, spiders for pipe support, end seals, backfill and compaction of pits and related items required for a complete and working installation including requirements of the approved NCDOT encroachment contract. Prior to beginning excavation for bore/tunnel and receiving pits, the Contractor shall have a Professional Licensed Surveyor (PLS) establish control points for measuring settlement at each roadway crossing at 10' intervals along the centerline and 10' from each side of the pipeline. The PLS shall be licensed in the State of NC and shall monitor and record these points on a semi-weekly (i.e., twice per week) basis until the construction of the tunnel is completed.

New ductile iron piping with restrained joints within the jacked casing pipe will be paid for at the unit price bid under Pay Item A, and new manholes at the jacking and receiving pits will be paid for at the unit price bid under Pay Item B.

Payment for the guaranteed jacked bore/tunnel shall be made on a linear foot basis measured on a horizontal plane to each end of the steel casing pipe.

PAY ITEM D – Stream Crossings (Permanent and Temporary)

Payment for this item includes furnishing all materials, equipment, labor, and incidentals for installation of the permanent and temporary stream crossings per Detail 1/D2 and Detail 0227019, respectively, as shown on the Contract Drawings. Payment will be made on a lump sum basis (per each stream crossing) as indicated in the Bid Form.

Payment for all new ductile iron piping with restrained joints will be paid for at the unit price bid under Pay Item A.

PAY ITEM E – Furnish and Install Tie-In Connections

Payment for this item is inclusive of all work required to connect new piping to existing piping and/or manhole as shown on the Drawings. This includes furnishing all materials, labor, and incidentals including furnishing and installing piping, anti-seep collars, couplings/sleeves, excavating and dewatering, shoring, foundation stone, backfill and compaction, restoration to rough grade, testing, and all other appurtenances required to make the tie-in connections, as shown on the Drawings. New manholes at the tie-in connections will be paid for at the unit price bid under Pay Item B.

Payment will be made on a lump sum basis (per each tie-in connection made) as indicated in the Bid Form.

PAY ITEM F – Clearing and Grubbing

Payment for this item includes furnishing all material, labor and equipment for clearing of new right-of-ways and new temporary/permanent construction easements to the full clearing limits as shown on the Drawings unless otherwise noted on the Drawings and/or stipulated within the Owner's Concession Letters. This work includes hauling and disposal of the cleared material. Payment will be made on a lump sum basis based upon estimated percentage completed.

PAY ITEM G – Provide Temporary Bypass Pumping

Payment for this item includes furnishing all material, equipment, fuel, maintenance, and labor for the set-up, operation and removal of the bypass pumping system as required for maintaining flow of the existing sanitary sewer during installation of the new pipe and manholes at the tie-in connections. Payment will be made on a lump sum basis based upon estimated percentage completed.

PAY ITEM H – Sedimentation and Erosion Control

Payment for this item includes furnishing all material, equipment and labor to install, maintain, and remove the sedimentation and erosion control measures as shown and scheduled on the Drawings and as required by the approved NC DEQ Land Quality permit, including silt fencing, stabilized silt fence outlet, and stabilized construction entrances. Payment will be made on a lump sum basis based upon estimated percentage completed.

PAY ITEM I – Landscaping, Seeding and Straw Cover

Payment for this item includes furnishing all materials, equipment and labor to fine grade, seed and straw cover, both temporary seeding and final seeding, all disturbed areas along the new sanitary sewer corridor and temporary/permanent construction easements. Payment will be made on a linear foot basis based upon estimated percentage completed.

PAY ITEM J – Rock Excavation

Payment for item includes furnishing all materials, equipment, labor, permitting, disposal, and incidentals required for removal of rock within the trench width limits that cannot be removed by standard trench excavation equipment and a track hoe bucket. Rock shall be as defined in Specification Section 02220, Paragraph 1.04. Measurement shall be by nominal pipe diameter plus 24-inches on either side, from 6-inches below bottom of pipe up to location where rock excavation cannot take place by a track hoe bucket. Measurements for structures will be the outside dimensions of the structure plus 24-inches on either side to the depth of the subgrade under the structure as required by the Drawings. This item includes solid rock excavation for the jacking pit and receiving pit but does not include rock removed during guaranteed jack and bore/tunnel operations within the limits of the casing pipe shown on the Drawings. Measurement for jacking pit shall not exceed 40' x 20' x 2' below invert of casing and for receiving pit 10' x 10' x 2' below invert of casing.

Abandoned concrete foundations, pipe and pavements shall not be considered solid rock excavation.

Payment for this item will be made for rock which cannot be removed with on-site trench digging equipment (i.e., track hoe bucket) and must be removed by blasting, hoe-ram, hob-knocker, jack

hammer, or other mechanical methods where authorized by the Engineer. Payment for this item will be based on the unit price bid per cubic yard of rock removed and approved by the Engineer. The minimum amount to be bid for this item is \$75.00 per cubic yard for blasting and \$100.00 per cubic yard for removal by mechanical means.

No other payment will be made for additional rock removal and disposal beyond the limits specified within this pay item description.

PAY ITEM K – Additional Stone

Payment for this item will be made for additional rip-rap (Class 2) and stabilization stone (NCDOT #67) where not specifically shown on the Contract Drawings and/or included with other Pay Items. The unit price bid shall include all materials, equipment and labor including undercut excavation, removal and off-site disposal of the unsuitable material, delivery, handling, placing, compaction, and any other associated costs where authorized by the Engineer. Payment will be made on a per ton basis.

PAY ITEM L - Select Backfill

Payment for this item includes all material, equipment, labor, delivery, hauling, handling, placing, compaction, and any other associated costs, including removal and off-site disposal of unsuitable material that cannot be used for backfill, where authorized by the Engineer, when excavated materials are not suitable to be placed back in the trench. The minimum amount to be bid for this item is \$10 per cubic yard. Payment will be made on a per cubic yard basis.

PAY ITEM M – Abandonment and Demolition of Existing Pump Stations

Payment for work under this item includes the demolition of the three (3) existing pump stations (Scotch Meadows, Grace Meadows, and Brookhaven) as detailed within the Contract Documents including the removal of wetwells, pumps, all associated electrical work, manholes, fencing, concrete pads, restoration of surfaces complete with grassing, and hauling and disposal of all demolished material and wastewater (including pumping) including any landfill tipping fees. Contractor to coordinate with Owner regarding specific materials to be turned over to the Owner.

PAY ITEM N - Laterals and Connections

Payment for work under this item includes furnishing and installing new 4-inch diameter laterals complete with wyes, tees, bends, pipe and sleeves as required per Detail UC-11. Payment for this item will be made on a per lateral basis where authorized by the Engineer. Length of lateral shall stop at the permanent construction easement (PCE).

PAY ITEM O – Access Gates and Fencing

Payment for work under this item includes furnishing and installing permanent fencing and gates in accordance with details on the Contract Drawings. Payment for this item will be made on a per gate basis where authorized by the Engineer. Fencing shall be extended to the temporary construction easement (TCE).

PAY ITEM P – Mobilization (Maximum of 3% of Total Bid Price)

Payment for this item includes all costs incurred prior to beginning the Work including permits, licenses, fees, insurance, bonds, equipment mobilization, and other associated expenses, in accordance with the Contract Documents. Payment shall be limited to 3% of the Total Bid Price and will be paid with the first payment application. If an amount greater than 3% of the Total Bid Price is entered in the Bid Form, then the difference in the percentage entered and the 3% maximum limit will be paid on the final payment application.

PAY ITEM Q – Contingency Allowance

The Contingency Allowance is to provide payment for unseen conditions which may be encountered in the Work and is to be used only upon a Written Amendment, a Written Change Order, or a Written Work Change Directive from the Engineer. Any unused portion of the allowance remaining at the completion of the Contract shall revert back to the Owner as a credit.

- END OF SECTION -

SECTION 01040

COORDINATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall allow the Owner or his agents, and other project Contractors or their agents, to enter upon the work for the purpose of constructing, operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed or relocated at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the protection of any other work by the Owner, or others, to be done in connection with his work, or in connection with normal use of the facilities.
- B. Contractor shall cooperate fully with the Owner, the Engineer, and all other Contractors employed on the work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.
- C. Contractor shall assume full responsibility for the correlation of all parts of his work with that of other Contractors. Contractor's superintendent shall correlate all work with other Contractors in the laying out of work. Contractor shall lay out his own work in accordance with the Drawings, Specifications, and instructions of latest issue and with due regard to the work of other Contractors.
- D. Periodic coordinating conferences will be held per Section 01200, Project Meetings.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 — GENERAL

1.01 THE REQUIREMENT

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement. Any violations of laws and fines imposed shall be the sole responsibility of the Contractor including payment of fines.
- B. Sedimentation and Erosion Control measures shall be provided in accordance with the North Carolina Erosion and Sediment Control Planning and Design Manual.
- C. The Contractor shall be fully responsible for any and all violations of all project and site-related permit conditions. In the event that a violation occurs or if a Notice of Violation is received, the Contractor shall take immediate action to correct the violation as directed or required by Local, State and Federal Agencies. Any penalties resulting from such violation shall be assessed to the Contractor. In the event that a violation resulting from the Contractor's activities results in a Cease Work Order by the Corps of Engineers, or actions from other agencies, the Contractor shall be held fully responsible for all damages resulting from such delay and any associated penalties

1.03 ARCHEOLOGICAL FINDS

- A. Notwithstanding anything to the contrary herein, in the event any archeological artifacts within the project are discovered during the course of the Work, the Owner shall have and retain all right, title, and interest to such artifacts and shall have the further right, during the course of the Contract, to examine or cause to have examined, the site of the Work for any such artifacts and to perform or have performed archeological excavations and all other related work to explore for, discover, recover and remove such artifacts from the site of the Work. In the event the work or archeological examination and related work delays the Contractor's work, he/she shall be entitled to an extension of time to complete the work equal to the number of days he/she is thus delayed. Such delay shall be considered an excusable delay.

1.04 NOTIFICATIONS

- A. The Contractor shall notify the Engineer promptly if hazardous or environmentally degrading conditions are discovered in the field.
- B. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. Failure of the Engineer to provide such notice shall not relieve the Contractor of his responsibility to comply with all applicable specification provisions, regulations and laws. State or local agencies responsible for verification of certain aspects of the environmental protection requirements may notify the Contractor in writing of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.05 PROTECTION OF AIR QUALITY

- A. Burning. The use of burning at the project site for the disposal of refuse and debris shall NOT be permitted.
- B. Dust Control. The Contractor shall maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within and outside the project boundaries free from dust by keeping the area wetted by sprinkling.
- C. Sprinkling shall be repeated at such intervals as to keep all parts of the disturbed area damp at all times, and the Contractor shall have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

- END OF SECTION -

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Submit Applications for Payment to the Engineer in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.
- B. Submit applications typed on forms provided by the Owner with itemized data typed on 8-1/2- by 11-inch or 8-1/2- by 14-inch white paper continuation sheets. The Contractor will provide the following documents with each payment request:
 - 1. State/County Sales Tax Statement & Certification.
 - 2. Payment Affidavit – Subcontractor/Supplier Utilization.
 - 3. Signed Estimate Form.
 - 4. “Surety Acknowledgement of Payment Request” letter.
 - 5. Preliminary as-built drawings for the month’s work.
- C. Provide itemized data on continuation sheet:
 - 1. Format, schedules, line items, and values: Those of the Schedule of Values accepted by the Engineer.

1.02 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Work Change Directives and Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of Contract firm.
- B. Continuation Sheets:
 - 1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
 - 2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.

- a. Round off values to nearest dollar, or as specified for Schedule of Values
 3. List each Work Change Directive and Change Order executed prior to date of submission, at the end of the continuation sheets.
 - a. List by Work Change Directive and/or Change Order Number and description, as for an original component item of work.
 4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment
- C. Payment Affidavits. To determine whether disparities exist in Owner contracting based on race, gender or other factors, and also to measure the effectiveness of the Owner's Minority and Women Business Enterprise (MWBE) program, the Owner tracks the utilization of first-tier subcontractors and suppliers on certain Owner contracts based on race, gender, and other factors. For analysis purposes, it is important that the Owner obtain this data not only for minority and female suppliers and subcontractors, but also for other subcontractors and suppliers. As a condition to receiving payment under this Agreement, the Contractor agrees to provide to the Owner with each invoice for payment submitted under this Agreement, a written payment affidavit detailing the amounts paid by the Contractor to first tier subcontractors and suppliers in connection with this Agreement ("Payment Affidavits"). Payment Affidavits shall be in the format specified by the Owner from time to time, and shall include all payments made to first tier subcontractors and suppliers under this Agreement that are not included on a prior Payment Affidavit. Failure to provide a properly completed version of each Payment Affidavit required by this Section shall constitute a default under this Agreement, and shall entitle the Owner to: (a) withhold payment of any amounts due the Contractor (whether under this Agreement or otherwise), or (b) exercise any other remedies legally available for breach of this Agreement; or (c) impose any other sanctions permitted under the MWBE program.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:
 1. Project.
 2. Application number and date.
 3. Detailed list of enclosures.
 4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Invoice with cost.
- B. Submit one copy of data and cover letter for each copy of application.

- C. As a prerequisite for payment, Contractor is to submit a "Surety Acknowledgment of Payment Request" letter showing amount of progress payment which the Contractor is requesting.
- D. The Contractor is to submit a Tax Statement and Certification, along with the applicable invoices showing the taxes, with each application for payment, original signed in blue ink, on the forms provided in Sections 00810, 00820, and 00830.
- E. Contractor's progress schedule shall be up to date and complete as a prerequisite for monthly payment.
- F. Contractor's red-line as-built record drawings shall be up to date and complete as a prerequisite for monthly payment.

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Refer to Section 01700 - Contract Closeout, for additional requirements.
- C. Contract Closeout Documents: The Contractor will provide the following documents with the final payment request:
 - 1. Consent of Surety to Final Payment (AIA G707-1994).
 - 2. Contractor's Affidavit of Release of Liens (G706A-1994)
 - 3. Contractor's Affidavit of Payment of Debts and Claims (AIA G706-1994)
 - 4. State/County Sales Tax Statement and Certification (Prime & Subcontractors).
 - 5. Signed Estimate Form.
 - 6. Final set of red-line as-built record drawings.

Final payment will not be authorized until these documents have been properly completed and submitted by the Contractor, and all deficiencies noted at the final inspection have been corrected and approved.

1.05 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Engineer at the times stipulated in the Agreement.
- B. Number: Five (5) copies of each Application.
- C. When the Engineer finds Application properly completed and correct, the Engineer will transmit certificate for payment to Owner, with copy to Contractor.

- D. Applications for payment will not be paid if the Contractor does not have an updated construction schedule for the basis of payment.

- END OF SECTION -

SECTION 01153

CHANGE ORDER PROCEDURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Promptly implement change order procedures.
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records of work done on a time-and-material/force account basis. Coordinate daily with Owner's and Engineer's field staff to confirm quantities.
 - 3. Provide full documentation to Engineer on request.
- B. Designate in writing the member of Contractor's organization:
 - 1. Who is authorized to accept changes in the Work.
 - 2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the Work.
- C. Owner will designate in writing the person who is authorized to execute Change Orders and Work Change Directives.
- D. Owner or Engineer may initiate changes by submitting a Request for Proposal (RFP) to Contractor. Request will include:
 - 1. Detailed description of the Change, products, and location of the change in the Project
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.
 - 4. A specific period of time during which the requested price will be considered valid.
 - 5. Such request is for information only and is not an instruction to execute the changes nor to stop work in progress.
- E. Contractor may initiate changes by submitting a written notice to Engineer, containing:
 - 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.

3. Statement of the effect on the Contract Sum and the Contract Time.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.02 WORK CHANGE DIRECTIVE AUTHORIZATION

- A. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate the method of determining any change in the Contract Contingency Allowance and any change in Contract Time. Owner and Engineer will sign and date the Work Change Directive Authorization as authorization for the Contractor to proceed with the changes. Contractor will sign and date the Work Change Directive Authorization to indicate agreement with the terms therein.

1.03 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.
- B. On request, provide additional data to support time and cost computations
 1. Labor required.
 2. Equipment required.
 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 4. Taxes, insurance, and bonds.
 5. Credit for work deleted from Contract, similarly documented.
 6. Overhead and profit.
 7. Justification for any change in Contract Time based upon impact to the current project schedule. The Owner owns all float.
- C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information.
 1. Name of the Owner's authorized agent who ordered the work and date of the order.

2. Dates and times work was performed and by whom.
 3. Time record, summary of hours worked, and hourly rates paid. Receipts and invoices for:
 - a. Equipment used, listing dates and times of use.
 - b. Products used, listing of quantities.
 - c. Subcontracts.
 4. Signature page for sign off by Owner's representative on a daily basis.
- D. Document requests for Substitutions for Products as specified in the Standard General Conditions of the Construction Contract.
- 1.04 PREPARATION OF CHANGE ORDERS, WORK CHANGE DIRECTIVES, AND FIELD ORDERS
- A. Engineer will prepare each Change Order, Work Change Directive, and Field Order.
 - B. Forms: Refer to Sections 00840, 00850, and 00860.
 - C. Change Orders and Work Change Directives will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
 - D. Change Orders will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
 - E. Work Change Directives will provide an accounting of the adjustment in the Contingency Allowance and in the Contract Time.
 - F. Field Orders will describe interpretations or clarifications of Contract Documents, order minor changes in the Work, and/or memorialize trade-off agreements.
 - G. Field Order work will be accomplished without change in the Contract Sum, Contract Time, and/or claims for other costs.
 - H. Upon execution of a Change Order and/or a Work Change Directive, Contractor waives any past, present or future claims for direct, indirect, impact, delay, inefficiency, acceleration, and increased staff, general conditions, and home office costs.
- 1.05 CORRELATION WITH CONTRACTOR'S SUBMITTALS
- A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Contingency Allowance.
 - B. Periodically revise the Construction Schedule to reflect each change in Contract Time.

- C. Upon completion of work under a Change Order or Work Change Directive, enter pertinent changes in Record Documents.

- END OF SECTION -

SECTION 01200
PROJECT MEETINGS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Attendance at and participation in, Project Meetings to address project deliverables, schedules, status and other related issues.

1. Preconstruction Meeting

a. A preconstruction meeting will be held after Award of Contract, but prior to starting work at the site.

b. Attendance:

- 1) Owner
- 2) Engineer
- 3) Contractor
- 4) Major subcontractors as required
- 5) Safety representative
- 6) Representatives of governmental or other regulatory agencies

c. Minimum Agenda:

- 1) Contract and Insurance
- 2) Tentative construction schedule
- 3) Critical work sequencing
- 4) Designation of responsible personnel
- 5) Processing of Field Decisions and Change Orders
- 6) Submittal of Shop Drawings and samples
- 7) Procedures for maintaining record documents
- 8) Use of site and Owner's requirements
- 9) Major equipment deliveries and priorities

- 10) Safety and first aid procedures
- 11) Security procedures
- 12) Housekeeping procedures
- 13) Processing of Partial Payment Requests
- 14) General regard for community relations

2. Progress Meetings

- a. Progress meetings will be held monthly (or as required) at a location to be determined by the Engineer during the performance of the Work of this Contract. Additional meetings may be called as progress of Work dictates.
- b. Engineer will preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.
- c. Attendance:
 - 1) Owner
 - 2) Engineer
 - 3) Contractor
 - 4) Subcontractors, as required and with Engineer's approval or request, as pertinent to the agenda
- d. Minimum Agenda:
 - 1) Review and approve minutes of previous meetings.
 - 2) Review progress of Work since last meeting, and Contractor shall have available one copy of as-built drawings of work since last progress meeting.
 - 3) Review proposed 30-60 day construction schedule.
 - 4) Note and identify problems which impede planned progress.
 - 5) Develop corrective measures and procedures to regain planned schedule.
 - 6) Revise construction schedule as indicated and plan progress during next work period.
 - 7) Discuss Payment Requests as required.
 - 8) Review Shop Drawing Log and status.

- 9) Maintaining of quality and work standards.
- 10) Review monthly as-built drawings.
- 11) Review any old business and discuss new.
- 12) Schedule next progress meeting.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01300

SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The mechanics and administration of the submittal process for shop drawings and miscellaneous submittal items.
- B. Before fabrication of any materials, the Contractor shall submit bookmarked electronic shop drawings in PDF format, and if required by the Engineer, seven (7) paper copies to the Engineer for review. The Contractor shall be responsible for securing all of the information, details, dimensions, drawings, etc., necessary to prepare the shop drawings. The Contractor shall field verify all dimensions and elevations required for completeness and accuracy of the drawings.

1.02 DEFINITIONS

- A. Shop Drawings:
 - 1. See General Conditions.
 - 2. Product data and samples are Shop Drawing information.
- B. Miscellaneous Submittals: (included in other Sections)
 - 1. Submittals other than Shop Drawings:
 - 2. Representative types of miscellaneous submittal items include but are not limited to:
 - a. Construction schedule.
 - b. Concrete, soil compaction, and pressure test reports.
 - c. Manufacturer's installation certification letters.
 - d. Warranties.
 - e. Construction photographs.
 - f. Survey data.
 - g. Cost breakdown (Schedule of Values).

1.03 TRANSMITTALS

A. Shop Drawings and Miscellaneous Submittals

1. Transmit all submittals to:

Hazen and Sawyer
9101 Southern Pine Boulevard, Suite 250
Charlotte, North Carolina 28273
Attn: Ellie Mierzejewski, PE
emierzejewski@hazenandsawyer.com
(704) 357-3150

2. All transmittals must be from Contractor and bear his approval stamp.

a. Shop drawings transmittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.17."

b. Operation and Maintenance Manual transmittal stamp may be Contractor's standard approval stamp.

3. Provide submittal information defining specific equipment or materials utilized on the project. Generalized product information not clearly defining specific equipment or materials to be provided will be rejected.

4. Calculations required in individual specification sections will be received for information purposes only and will be returned stamped "For Information Only" to acknowledge receipt.

5. Submittal schedule:

a. Schedule of shop drawings:

1) Submitted and approved within 20 days of receipt of Notice to Proceed.

2) Account for multiple transmittals under any specification section where partial submittals will be transmitted.

b. Shop drawings:

1) Submittal and approval prior to 25 percent completion.

c. Operation and Maintenance Manuals and Equipment Record Sheets:

1) Initial submittal within 60 days after date shop drawings are approved.

2) Full payment will not be made on any equipment or materials received until an approved O&M is received.

6. Retainage will not be reduced until all shop drawings are approved.
7. Final payment will not be made on any equipment or materials received until an approved O&M manual is received.

1.04 PREPARATION OF SUBMITTALS

A. Shop Drawings:

1. Scope of any letter of transmittal:
 - a. Limited to one Specification Section.
2. Numbering letter of transmittal:
 - a. A 10 character submittal identification numbering system shall be used:
 1. The first character shall be a D, M, R, S, or U, which represents Shop/Working Drawing and other Product Data (D); Operation and Maintenance Manual (M); Certification, Test Results, and ISA Forms (R); Sample (S); or Test Procedures (U).
 2. The next five digits shall be the applicable Specifications Section Number.
 3. The next three digits shall be the numbers 001-999 to sequentially number each separate item or drawing submitted under each specific Section number.
 4. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same Drawing, i.e., A-1st submission, B-2nd submission, C-3rd submission, etc. A typical submittal number would be as follows:

D-15260-008-B

D	=	Shop Drawing
15260	=	Specification Section for Insulation
008	=	The eighth sequential submittal under this specification section
B	=	The second submission (first resubmission) of that particular shop drawing.

3. Describing transmittal contents:
 - a. Provide listing of each component or item in submittal capable of receiving an independent review action.
 - b. Identify for each item:

- 1) Manufacturer and Manufacturer's drawing or data number.
 - 2) Contract Document tag number(s).
4. Resubmittals:
- a. Do not increase the scope of any prior transmittal.
5. For 8-1/2 x 11 inch size sheets, provide three copies of each page for Engineer/Owner plus the number required by the Contractor. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed six (6).
6. For items not covered in paragraph 1.04-A.5 submit one reproducible transparency and one print of each drawing until approval is obtained. Utilize mailing tube; do not fold. The Engineer will mark and return the reproducible to the Contractor for his reproduction and distribution.
7. Provide clear space (3 square inches) for Engineer stamping of each component.
8. Contractor shall not use red color for marks on transmittals. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
9. Transmittal contents:
- a. Coordinate and identify shop drawing contents so that all items can be easily certified by the Engineer.
 - b. Identify equipment or material use, tag number, drawing detail reference, weight, and other project specific information.
 - c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
 - d. Submit items like equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 inch pages. Indicate exact item or model and all options proposed.
 - e. Include legible scale details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout drawings, parts catalogs, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data. Arrange data and performance information in format similar to that provided in Contract Documents. Provide, at minimum, the detail provided in the Contract Documents.
 - f. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

B. Samples:

1. Identification:
 - a. Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Standard Specification section or drawing detail reference, color, range, texture, finish and other pertinent data.
 - b. If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.
2. Include application specific brochures, and installation instructions.
3. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.
4. Resubmit sample of rejected items.

1.05 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
 - a. FURNISH AS SUBMITTED (FAS) – no exceptions are taken
 - b. FURNISH AS CORRECTED (FAC) – minor corrections are noted and shall be made
 - c. FURNISH AS CORRECTED – CONFIRM (FACC) – some corrections are noted and a partial submittal or additional information are required as specifically requested
 - d. REVISE AND RESUBMIT (R&R) – major corrections are noted and a full resubmittal is required
 - e. RECEIPT ACKNOWLEDGE – submittal was received and was distributed for record purposes without review
2. Transmittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp. Drawings not stamped by the Contractor will not be reviewed for technical content and will be returned without any action.
3. Transmittals returned with Action "FAS" or "FAC" are considered ready for fabrication and installation.
4. Transmittals returned with Action "FACC", the Contractor shall submit sufficient information to satisfactorily address Engineer's comments.

5. Samples may be retained for comparison purposes. Remove samples when directed. Include in bid all costs of furnishing and removing samples.
6. Approved samples submitted or constructed, constitute criteria for judging completed work. Finished work or items not equal to samples will be rejected.
7. Submittals shall be transmitted in sufficient time to allow the Engineer at least thirty (30) working days for review and processing.

1.06 EQUIPMENT WARRANTIES

- A. The equipment furnished under this Contract shall be guaranteed to be free from defects in workmanship, design and/or materials for a period of one (1) year unless otherwise specified. The period of such warranties shall start on the substantial completion date provided that the equipment demonstrates satisfactory performance during the thirty day operational period after the equipment startup. If the equipment does not perform satisfactorily during the thirty day operational period, the start of the warranty period will be delayed until the equipment demonstrates proper operation. Warranties and guarantees shall be indicated on a form satisfactory to the Engineer and Owner. The Equipment Supplier shall repair or replace without charge (i.e. parts and labor) to the Owner any part of equipment which is defective or showing undue wear within the guarantee period, or replace the equipment with new equipment if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the equipment to its specified performance level.
- B. Certification of start-up and full testing shall be performed by the manufacturer using the services of an authorized service representative trained in this type service. Written certification shall be filed with the Engineer on the manufacturer's stationary. Written certification shall be filed in triplicate and shall indicate tests he made in accordance with the manufacturer's recommendations, and that the test and start-up operation has been satisfactory, and that the equipment is fully operational under design requirements.
- C. The Contractor and manufacturer or supplier shall submit, with the Shop Drawings for review and approval, a guarantee for the equipment submitted. The guarantee shall be in a form acceptable to the Engineer and Owner.

1.07 RECORD DRAWINGS

- A. The Contractor shall maintain an accurate and current set of record drawings during the construction. Record drawings shall indicate any changes from the Contract Drawings due to field orders, change orders, differences in equipment and materials provided from those shown on the drawings, or changes in locations of features from those shown on the drawings.
- B. The Contractor shall maintain record drawing information current as the project progresses and present a red-line mark-up record drawing and be prepared to verify status of the record drawings for the Engineer at the monthly progress meetings prior to submission of partial payment request. Contractor shall maintain adequate regular backups of data files to assure no loss of information.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01320

PROJECT PHOTOGRAPHS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Provide documentation of pre-existing, as well as pertinent as-built conditions of project site and construction.

1. Video Recording

- a. A pre-construction video shall be taken by the Contractor to record pre-existing site conditions for the entire site.
- b. The video recording shall be in sufficient detail to provide evidence of pre-existing contours, drainage, pavement, driveways, curb and gutter, fencing, structures, signage, culverts, mailboxes, trees, shrubs, and all other existing features which may be disturbed during construction.
- c. The original video (and one copy) shall be provided to the Engineer prior to beginning construction activities.

2. Construction Photographs

- a. The General Contractor shall engage a competent photographer (can be Contractor employee) to take photographs at the locations and at such stages of the construction as directed by the Engineer or Owner.
- b. Provide a minimum of five (5) different exposures per week for each work area, for the duration of the Contract time. When directed by the Engineer, frequency of photographs may be increased. Engineer may waive requirements for photographs during inactive construction periods in favor of increased photographs during active construction sequences.
- c. Submittal Requirements
 - 1) One set of prints of each photograph required by Item 2 above. Photographs shall be at least 3-inches by 5-inches in size, with the date, and description affixed thereto, shall be submitted to the Engineer with monthly pay estimates. Digital format of photos on a flash drive are acceptable in lieu of paper copies.
 - 2) At completion of the work, a CD of all photographs shall be turned over to the Owner.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01330
PROJECT SCHEDULE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Progress Schedule

1. Within twenty (20) days after issuance of the Notice of Award, the Contractor shall prepare and submit four (4) copies of his proposed progress schedule to the Engineer for review and approval.
2. Key PROJECT MILESTONES to be incorporated in Proposed Contract Schedule include but are not necessarily limited to the following project:
 - a. Contract Notice to Proceed.
 - b. Mobilization: Contractors option.
 - c. Erosion control device installation.
 - d. Delivery of critical materials.
 - e. Shop drawing submittal schedule: See Section 01300.
 - f. Milestone completion dates for critical areas, such as partial activations.
 - g. Substantial Completion, see Agreement for dates of Substantial Completion.
 - h. Substantial and satisfactory completion (Final completion) for all Work: See Agreement (Section 00500) for date of Final Completion.

Account for schedule of Subcontracts. Include proper sequence of construction, (including tie-ins, interconnects, and service relocations) various crafts, purchasing time, shop drawing approval, material delivery, equipment fabrication, startup, demonstration, and similar time consuming factors. Show on schedule as a minimum, earliest starting, earliest completion, latest starting, latest finish, and free and total float for each task or item.

No Work will be scheduled on weekends or legal holidays as previously stipulated in Section 01010, Paragraph 1.07 unless permitted with prior written acceptance of the Owner. This requirement will be waived for any emergency that threatens the safety of the public or puts the Project at risk.

3. If so required, the schedule shall be revised until it is approved by the Engineer.

4. Schedule shall be updated monthly, depicting progress to the last day of the month and four (4) copies submitted to the Engineer with the application for progress payment.
5. Schedule shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the work and identifying construction activities for each portion of work.
6. Updated schedule shall show all changes since the previous submittal.
7. All revisions to the schedule must have the prior approval of the Engineer.
8. If Contractor does not take necessary action to accomplish work according to schedule, he may be ordered by Owner in writing to take necessary and timely action to improve work progress. Order may require increased work forces, extra equipment, extra shifts or other action as necessary. Should Contractor refuse or neglect to take such action authorized, under provisions of this contract, Owner may take necessary actions including, but not necessarily limited to, withholding of payment and termination of contract.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

- A. The Contractor agrees that whenever it becomes apparent from the current monthly schedule that delays have resulted and that the Contract completion date shall not be met or when so directed by the Engineer, he shall take some or all of the following actions at no additional cost to the Owner, submitting to the Engineer for approval, a written statement of the steps he intends to take to remove or arrest the delay to the current schedule.
 1. Increased construction manpower in such quantities and crafts as shall substantially eliminate, in the judgment of the Engineer, the backlog of work.
 2. Increase the number of working hours per shift, shifts per working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate, in the judgment of the Engineer, the backlog of work.
 3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

3.02 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

- A. If the Contractor desires to make changes in his method of operating which affect the current schedule, he shall notify the Engineer in writing stating what changes are proposed

and the reason for the change. If the Engineer agrees to the changes, the Contractor shall revise and submit for review, without additional cost to the Owner, all of the affected portion of the schedule. The schedule shall be adjusted by the Contractor only after the Engineer agrees to the proposed changes.

- B. Adjustments may consist of changing portions of the activity sequence and/or activity durations, division of approved activities, or other adjustments as may be agreed to by the Engineer. The addition of extraneous, non-working activities and/or activities which add restraints to the schedule shall not be agreed to.
- C. If the completion of any activity, whether or not critical, falls more than 100 percent behind its duration, the Contractor shall submit for review a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.
- D. Shop drawings which are not acceptable to the Engineer on the first submittal or within the scheduled time shall be immediately rescheduled, as well as pipelines and structures which do not pass hydrostatic/leak tests.
- E. The Contract completion time shall be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any Contract completion date, he shall furnish such justification and supporting evidence as the Engineer may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this Contract, Engineer shall after receipt of such justification and supporting evidence make findings of fact and shall advise the Contractor in writing thereof. If the Engineer finds that the Contractor is entitled to any extension of any Contract completion date under the provisions of this Contract, the Engineer's determination as to the total number of days' extension shall be based upon the current schedule and on all data relevant to the extension. Such data shall be included in the next monthly updating of the schedule.
- F. From time to time it may be necessary for the Contract schedule and/or completion time to be adjusted by the Engineer to reflect the effects of job conditions, technical difficulties, strikes, unavoidable delays on the part of the Owner or his representatives, and other unforeseeable conditions which may indicate schedule adjustments and/or completion time extension. Under such conditions, the Contractor shall reschedule the work and/or Contract completion time to reflect the changed conditions, and the Contractor shall revise his schedule accordingly. No additional compensation shall be made to the Contractor for such schedule changes except for unavoidable overall Contract time extensions beyond the actual completion of all unaffected work in the Contract, in which case the Contractor shall take all possible action to minimize any time extension and any additional cost to the Owner. It is specifically pointed out that the use of available float time in the schedule may be used by the Owner as defined by the Engineer, as well as by the Contractor. Float time is defined as the amount of time between the early start date, and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule.
- G. The Owner controls the float time in the current schedule and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates set out in the schedule, the Owner may initiate changes to the contract work that absorb float time only. Contractor-initiated changes that encroach on the float time identified in the current schedule may be accomplished with the Owner's concurrence. Such changes, however, shall give way to Owner-initiated changes competing for the same float time.

3.03 COORDINATING SCHEDULES WITH OTHER CONTRACT SCHEDULES

Where work is to be performed under this Contract concurrently with and/or contingent upon work performed on the same facilities or area under other contracts, the Contractor's schedule shall be coordinated with the schedules of the other contracts. The Contractor shall obtain the schedules of the other appropriate contracts from the Engineer for the preparation and updating of his schedule and shall make the required changes in his schedule when indicated by changes in corresponding schedules.

- END OF SECTION -

SECTION 01400
QUALITY CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Testing Laboratory Services

1. Laboratory testing and checking required by the Specifications, including the cost of transporting all samples and test specimens, shall be provided and paid for by the Owner unless otherwise indicated in the Specifications. Retesting, extra trip charges, or other expenses due to the Contractor's actions or inactions shall be paid by the Contractor and deducted as part of the pay application.
2. Materials to be tested include, but are not necessarily limited to the following: soil compaction, cement, concrete aggregate, concrete, bituminous paving materials, structural and reinforcing steel, select backfill, crushed stone or gravel and sand.
3. Tests required by the Owner shall not relieve the Contractor from the responsibility of supplying test results and certificates from manufacturers or suppliers to demonstrate conformance with the Specifications.
4. Employment of a testing laboratory shall in no way relieve Contractor of his obligation to perform work in accordance with the Contract Documents.
5. Procedure
 - a. The Contractor shall plan and conduct his operations to permit taking of field samples and test specimens, as required, and to allow adequate time for laboratory tests.
 - b. The collection, field preparation and storage of field samples and test specimens shall be as directed by the Engineer with the cooperation of the Contractor, including casual labor, access and handling.
6. Significance of Tests
 - a. Test results shall be binding on both the Contractor and the Owner, and shall be considered irrefutable evidence of compliance or noncompliance with the Specification requirements, unless supplementary testing shall prove, to the satisfaction of the Owner, that the initial samples were not representative of actual conditions.
7. Supplementary and Other Testing
 - a. Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the Owner to consider such test results, the test reports shall be certified by an independent testing

laboratory acceptable to the Owner. Testing of this nature shall be conducted at the Contractor's expense.

1.02 WATERTIGHTNESS OF STRUCTURES

- A. Contractor shall refer to Section 02604 for watertightness testing of utility structures.

1.03 IMPERFECT WORK, EQUIPMENT, OR MATERIALS

- A. Any defective or imperfect work, equipment, or materials furnished by the Contractor which is discovered before the final acceptance of the Work, as established by the Certificate of Substantial Completion, or during the subsequent guarantee period, shall be removed immediately even though it may have been overlooked by the Engineer and estimated for payment. Any equipment or materials condemned or rejected by the Engineer shall be tagged as such and shall be immediately removed from the site. Satisfactory work or materials shall be substituted for that rejected.
- B. The Engineer may order tests of imperfect or damaged work, equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work, equipment, or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.
- C. Contractor shall pay, at his own expense, for all costs associated with corrective work and retesting resulting from defective work or failed tests.

1.04 INSPECTION AND TESTS

- A. The Contractor shall allow the Engineer ample time and opportunity for testing materials and equipment to be used in the work. He shall advise the Engineer promptly upon placing orders for material and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the Engineer and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate possible delays that may be caused in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Engineer for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.
- B. The Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other Sections of the Specifications. The Contractor shall also place his orders for such equipment on the basis that, after the equipment has been tested prior to final acceptance of the work, the manufacturer will furnish the Owner with certified statements that the equipment has been installed properly and is ready to be placed in

functional operation. Tests and analyses required of equipment shall be paid for by the Contractor, unless specified otherwise in the Section which covers a particular piece of equipment.

- C. Where other tests or analyses are specifically required in other Sections of these Specifications, the cost thereof shall be borne by the party (Owner or Contractor) so designated in such Sections. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the Owner for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

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SECTION 01510

TEMPORARY UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall provide temporary light and power, heating, water service and sanitary facilities for his operations at the site when necessary. The temporary services shall be provided for use throughout the construction period.
- B. The Contractor shall coordinate and install all temporary services in accordance with the requirements of the utility companies having jurisdiction and as required by applicable codes and regulations.
- C. At the completion of the work, or when the temporary services are no longer required, the facilities shall be restored to their original conditions.
- D. All costs in connection with the temporary services including, but not limited to, installation, utility company service charges, maintenance, relocation and removal shall be borne by the Contractor at no additional cost to the Owner.
- E. Some temporary facilities that may be required may be indicated on the Drawings; however, the Drawings do not necessarily show any or all of the temporary facilities that the Contractor ultimately will need to complete the work.
- F. Temporary Sanitary Service
 - 1. Sanitary conveniences, in sufficient numbers, for the use of all persons employed on the work and properly screened from public observation, shall be provided and maintained at suitable locations by the Contractor, all as prescribed by State Labor Regulations and local ordinances. The contents of same shall be removed and disposed of in a manner consistent with local and state regulations, as the occasion requires. Each Contractor shall rigorously prohibit the committing of nuisances within, on, or about the work. Sanitary facilities shall be removed from the site when no longer required.
- G. Temporary Water
 - 1. The Contractor shall obtain temporary potable water service for construction purposes including flushing and testing, sanitary facilities, fire protection, field offices, and for cleaning from the County's potable water distribution system.
 - a. The Contractor shall pay for all charges associated with the temporary connection to and the amount of potable water used from the County's potable water distribution system. Contractor shall supply an approved backflow assembly and all other protective devices required by the County.

2. Contractor shall supply potable water for his employees and for all construction trailers either by portable containers or drinking fountains.
3. An adequate number of hose bibbs, hoses, and watertight barrels shall be provided for the distribution of water.
4. Water service shall be protected from freezing and the service shall be extended and relocated as necessary to meet temporary water requirements

H. Temporary Power.

1. Contractor is responsible for providing temporary power for lighting, tools and equipment, and any other uses in order to complete the Work.
2. Contractor is responsible for providing diesel fuel as needed for their temporary bypass pumping operations. Diesel fuel stored on-site shall be provided in a double containment to mitigate spillage and in accordance with all local, state, and federal regulations.

- END OF SECTION -

SECTION 01520

MAINTENANCE OF UTILITY OPERATIONS DURING CONSTRUCTION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The existing sewer facilities will be maintained in continuous operation by the Owner during the entire construction period of all Contracts as hereinafter specified. The intent of this section is to outline the minimum requirements necessary to allow the Owner to continuously operate and maintain the treatment facility in order to remain in compliance with all permit requirements.
- B. Work under each Contract shall be scheduled and conducted by the Contractor so as not to impede any treatment process, reduce the quality of the plant effluent or cause odor or other nuisance except as explicitly permitted hereinafter. In performing the work shown and specified, the Contractor shall plan and schedule his work to meet the plant and collection system operating requirements, and the constraints and construction requirements as outlined in this Section. No discharge of raw or inadequately treated wastewater shall be allowed. The Contractor shall pay all civil penalties, costs, assessments, etc., associated with any discharge of raw or inadequately treated wastewater associated with the Contractor's work.
- C. The Contractor shall be responsible for coordinating the general construction and any electrical and plumbing construction if applicable and for ensuring that permanent or temporary power is available for all existing, proposed, and temporary facilities that are required to be on line at any given time.
- D. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without cost to the Owner and provided that all requirements of these Specifications are fulfilled. The Contractor shall submit any such plan for providing additional temporary facilities to eliminate a constraint to the Engineer for review. Such plans must be approved by the Engineer and Owner prior to the Contractor proceeding. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

1.02 GENERAL CONSTRAINTS

- A. The Contractor shall schedule the Work so that the sewer facilities are maintained in continuous operation. All short-term system or partial systems shutdowns and diversions shall be approved by the Engineer. Long-term process shutdowns and diversions shall conform to the requirements hereinafter specified and shall be minimized by the Contractor as much as possible. If in the judgement of the Engineer a requested shutdown is not required for the Contractor to perform the Work, the Contractor shall utilize approved alternative methods to accomplish the Work. All shutdowns shall be coordinated with and scheduled at times suitable to the Owner. Shutdowns shall not begin until all required materials are on hand and ready for installation. Each shutdown period shall commence at

a time approved by the Owner, and the Contractor shall proceed with the Work continuously, start to finish, until the Work is completed and normal plant operation is restored. If the Contractor completes all required Work before the specified shutdown period has ended, the Owner may immediately place the existing system back into service.

- B. The Contractor shall schedule short-term and long-term shutdowns in advance. Shutdowns shall be fully coordinated with Charlotte Water at least 7 calendar days before the scheduled shutdown. Owner personnel shall operate Owner's facilities involved in the short-term and long-term shutdowns and diversions.
- C. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable collection system operation shall be furnished by the Contractor at the direction of the Engineer at no extra cost to the Owner.
- E. The Owner shall have the authority to order Work stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the plant operations.
- F. The Contractor shall provide the services of emergency repair crews on call 24-hours per day to affect repairs to portions of the sewer facilities affected by the Contractor's operations.
- G. For all long and short-term shutdowns, Contractor shall provide temporary bypass pumping per the requirements as stipulated in Specification Section 02665.

1.03 GENERAL OPERATING REQUIREMENTS, CONSTRAINTS, AND CONSTRUCTION REQUIREMENTS

- A. Access to Site, Roadways, and Parking Areas
 - 1. The Contractor is to access project site via the temporary construction access easements, public roadways, etc. as shown on the drawings.
 - 2. The Contractor shall provide temporary measures to protect the existing pavement by filling over with earthen material or supplying other measures acceptable to the Engineer, and he shall repair any damage to existing paved surfaces that occurs during the construction period. Any areas disturbed along the shoulders of the access road and interior roads and elsewhere shall be repaired, graded, seeded, etc. as necessary to match pre-existing conditions.
 - 4. The Contractor shall not undertake the restoration/construction of existing roadways shown on the Contract Drawings, until all the sewer line has been accepted by the Owner in that area.
 - 5. It shall be the responsibility of the Contractor to obtain any permits not already acquired that are required from NCDOT and other regulatory authorities and pay all associated fees.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

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SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.
- B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.
- C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

- A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.
- B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

- A. The General Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to insure safety to the public. All barricades and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

- B. Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or the general public.

1.04 EXISTING UTILITIES AND STRUCTURES

- A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.
- B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities where prior approvals (attached) have not already been obtained.
- C. THE INFORMATION ON THE DRAWINGS IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, BUT IS NOT GUARANTEED TO BE CORRECT OR COMPLETE. UNDERGROUND STRUCTURES NOT SHOWN MAY BE ENCOUNTERED. THE CONTRACTOR SHALL HEREBY DISTINCTLY UNDERSTAND THAT THE OWNER IS NOT RESPONSIBLE FOR THE CORRECTNESS OR SUFFICIENCY OF THE INFORMATION GIVEN; THAT HE SHALL HAVE NO CLAIM FOR DELAY OR EXTRA COMPENSATION ON ACCOUNT OF INCORRECTNESS, INSUFFICIENCY, OR ABSENCE OF INFORMATION REGARDING OBSTRUCTIONS REVEALED OR NOT REVEALED BY THE DRAWINGS; AND THAT HE SHALL NOT HAVE CLAIM FOR RELIEF FROM ANY OBLIGATION OR RESPONSIBILITY UNDER THE CONTRACT BECAUSE THE EXTENT, LOCATION, SIZE OR CHARACTER OF ANY PIPE OR OTHER UNDERGROUND STRUCTURE IS INCORRECTLY SHOWN OR HAS BEEN OMITTED FROM THE DRAWINGS.
- D. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If an interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that an interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.
- E. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterrupted of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority

having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

- F. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at his discretion, have the respective authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

1.05 FIELD VERIFICATION OF UTILITIES AND INTERFERENCES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND ELEVATION OF ALL UTILITIES AND STRUCTURES WHICH CROSS THE WORK SITES OR WHICH MAY BE AFFECTED BY HIS OPERATIONS. As required, the Contractor shall excavate to verify exact locations or elevations or utilities or other interferences in order to assure proper protection of existing utilities or structures. No extra payment will be made for such field verification or any excavations or other work or expense incurred by the Contractor in properly locating and protecting utilities or other interferences.

1.06 REPAIR OF EXISTING WATER AND SEWER SERVICES

- A. Where excavations by the Contractor require the removal and replacement of existing water or sewer services, the Contractor shall perform such work in a manner satisfactory to the Engineer and the Owner. The Contractor shall demonstrate extreme care not to "RIP" water or sewer services out during excavation of the trench.
- B. The Contractor shall replace/repair existing sewer services with new, similar-type materials to match existing conditions.
- C. The Contractor shall replace/repair existing water services with new, similar-type materials to match existing conditions.
- D. The cost for performing all such work shall be paid by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

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SECTION 01550

SITE ACCESS

PART 1 -- GENERAL

1.01 The Requirement

- A. Section includes site access and employee parking.

PART 2 – PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 Access

- A. The General Contractor shall utilize and maintain City/County and NCDOT public roads as required to perform the work of this Contract. Temporary construction access roads shall be constructed only within the permanent construction easements shown on the contract drawings as necessary.
- B. Additional access roads, construction corridors, staging areas, etc. may be obtained by the Contractor provided the Contractor independently secures easements for his use and convenience. Contractor shall submit written documentation to the Engineer for any Contractor secured easements across privately held property. Easement agreement shall specify terms and conditions of use and provisions for site restoration. A written release from the property owner certifying that the Contractor has complied with all terms of the easement agreement shall be furnished to the Engineer prior to final payment. Additional land disturbance permitting preparation and fees and adequate erosion control measures due to Contractor obtaining additional easements not shown on the plans shall be solely at Contractor's expense.
- C. Public roadways used by the Contractor shall be suitably maintained under the direction of the controlling authority by the Contractor at his expense during construction. Contractor shall not be permitted to restrict Owner access to existing facilities. Engineer may direct Contractor to perform maintenance of existing access roads when Engineer determines that such work is required to insure all weather access by the Owner.
- D. The Contractor shall obtain and pay all cost associated with any bonds required by the N.C. Department of Transportation for the use of State maintained roads.

3.02 Parking Areas

- A. Contractor shall construct and maintain suitable parking areas for his construction personnel on the project site where approved by the Engineer and the Owner.

3.03 Restoration

- A. At the completion of the work, the surfaces of land used for access roads and parking areas shall be restored by the Contractor to its original condition and to the satisfaction of the Engineer. At a minimum, such restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

3.04 Traffic Regulations

- A. Contractor shall obey all traffic laws and comply with all the requirements, rules and regulations of the County, NCDOT, etc., and local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

- END OF SECTION -

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

1.02 SUBMITTALS

A. Shop Drawings:

- 1. See Section 01300
- 2. Prior to the start of any construction activities submit:
 - a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
 - b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.
- B. Land Protection:
 - 1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition. Contractor shall confine his construction activities to areas defined for work within the Contract Documents.
 - 2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.

3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
6. Except for areas designated by the Contract Documents to be cleared and grubbed, the Contractor shall not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the Engineer/Owner. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense.

C. Erosion Protection: See Section 02276.

D. Surface Water Protection:

1. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Engineer. Physically retard the rate and volume of runoff and runoff by:
 - a. Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rock outlet protection, sediment traps and temporary basins.
 - b. Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.
 - c. Providing Construction sites with graveled or rock access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
2. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.

E. Solid Waste Disposal:

1. Collect solid waste on a daily basis.
2. Provide disposal of degradable solid waste to an approved solid waste disposal site.

3. Provide disposal of nondegradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Engineer/Owner and regulatory agencies.
4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

F. Control of Chemical Waste:

1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
4. The Contractor shall provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

G. Control of Dust:

1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants. The use of chemical agents such as calcium chloride must be approved by the State of NC DOT.
2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
3. The Engineer/Owner will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

H. Burning:

1. Do not burn material on the site. If the Contractor elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all agency regulations.

I. Control of Noise: Control noise by fitting equipment with appropriate mufflers.

J. Completion of Work:

1. Upon completion of work, leave area in a clean, natural looking condition.

2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.

K. Historical Protection:

1. If during the course of construction, evidence of deposits of historical or archaeological interests are found, cease work affecting find and notify Engineer. Do not disturb deposits until written notice from Engineer is given to proceed.

- END OF SECTION -

SECTION 01590

FIELD OFFICE, EQUIPMENT AND SERVICES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Resident Representative's / Owner's Field Office – Not Applicable

B. Contractor's Field Office

1. Contractor may, at his option and no additional cost to the Owner, furnish, equip and maintain a field office at the site of a size required for his operations. Contractor shall provide his own telephone and data service and shall have readily accessible at the field office, copies of the Contract Documents, latest approved Shop Drawings and all field Project related correspondence, Change Order, etc.

C. Project Sign and Sign Panel

1. The Contractor shall erect three (3) signs along the Project site identifying the Project at locations to be determined in the field by the Owner/Engineer. **The signs shall be erected within twenty-one (21) days after the Notice to Proceed**, and shall be in accordance with the Specifications and details included in this Section. Each project sign and sign panel shall be furnished, erected, and maintained by the Contractor at the location designated by the Engineer. Wording and colors shall be as shown on the detail at the end of this Section.
2. The project signs shall be fabricated, erected and maintained by the Contractor in accordance with the following specifications:
 - a) Sign Panel: The sign panel shall be constructed of 3/4 inch minimum thickness marine plywood rabbeted into a 2 inch x 4 inch wood frame. All fasteners used in the construction of the sign shall be of a rustproof nature.
 - b) Painting: All supports, trim and back of the sign panel shall be painted with at least two (2) coats of the same paint used for the sign face. All paint used shall be exterior grade paint, suitable for use on wood signs.
 - c) Sign Supports: The supports for the project sign shall be at least two 4" by 4" treated wood posts. The sign panel shall be securely fastened to the sign supports with at least six (6), 3/8" galvanized bolts, nuts and washers. The positioning and alignment of the sign shall be as determined by the Engineer.
 - d) Maintenance: The project sign shall be maintained by the Contractor, in good condition, at all times, for the duration of construction.

- e) Removal of Sign from Project Site: The removal of the project sign from the construction site by the Contractor shall be at the completion of construction, when ordered by the Engineer.
- f) Payment: The cost of the fabrication, erection, maintenance, and removal of the project sign, including all labor and materials, shall be included in the Contractor's Bid.

- END OF SECTION -

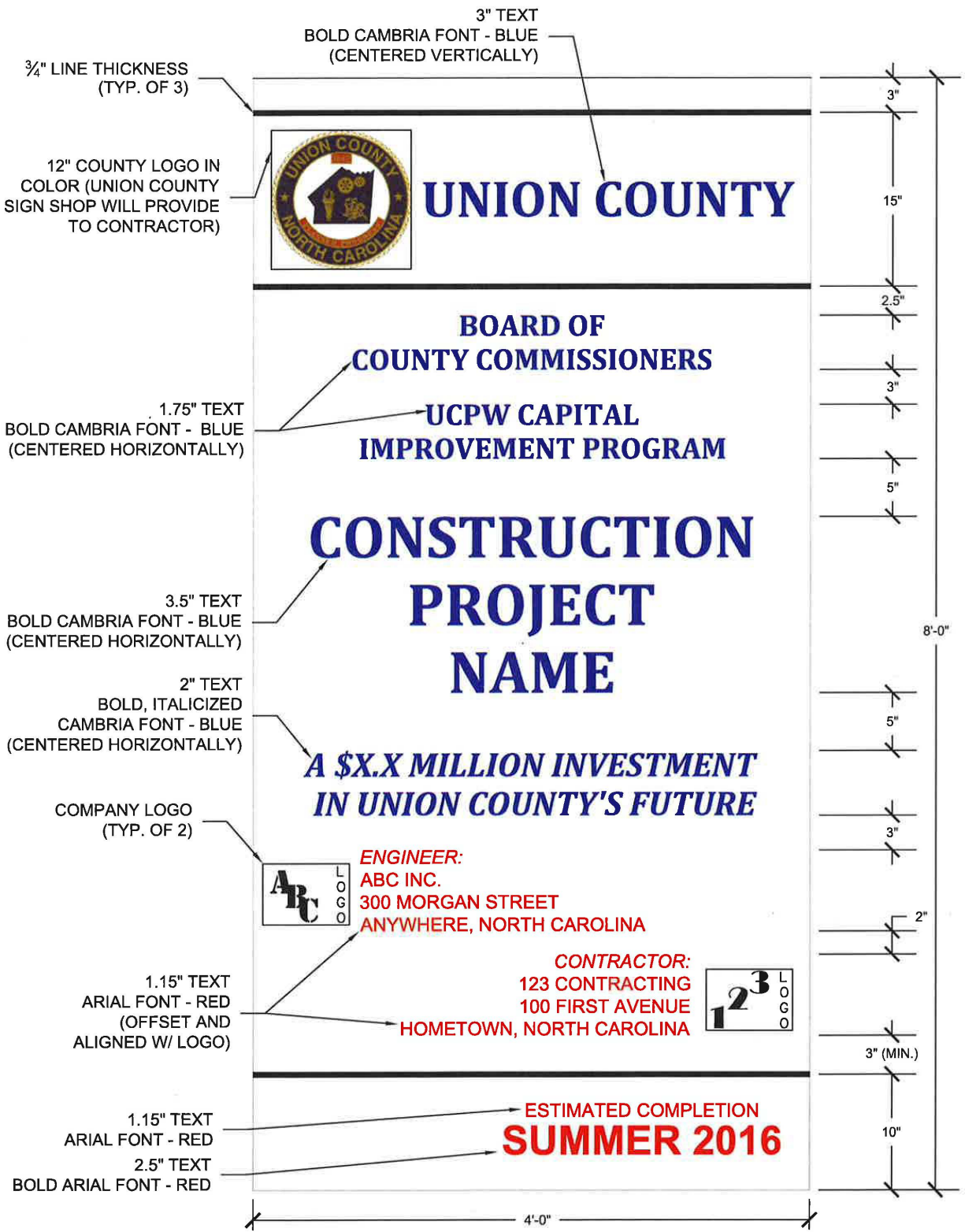


EXHIBIT A - STANDARD CONSTRUCTION PROJECT SIGN

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SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish and Install

1. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install, unless specifically stated otherwise.
2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

1.02 EQUIPMENT AND MATERIALS

- A. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

1.03 STORAGE OF EQUIPMENT AND MATERIALS

- A. Equipment and materials to be incorporated in the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.
- B. "Stringing" of pipe along route may be limited subject to Owner, NCDOT or safety requirements. Fully chock or restrain all pipe to prevent rolling.
- C. The Contractor shall protect all equipment and materials from deterioration and damage. Any equipment or materials of whatever kind which may become damaged or deteriorated from any cause shall be removed and replaced by good satisfactory items and at the Contractor's expense for both labor and materials.
- D. Contractor shall store his equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction.
- E. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

- F. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.
- G. Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.
- H. Materials shall not be placed within fifty (50) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times.
- I. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

1.04 INSTALLATION OF EQUIPMENT

- A. Equipment and materials shall be installed in accordance with the requirements of the General Conditions, Supplemental Conditions and the respective Specification Sections.

1.05 CONNECTIONS

- A. Connections to equipment shall follow manufacturer's recommendations as to size and arrangement of connections and/or as shown in detail on the Drawings or approved Shop Drawings. Piping connections shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -

SECTION 01700
PROJECT CLOSEOUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Final Cleaning

1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.
2. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.
3. Contractor shall maintain cleaning until project, or portion thereof, is occupied by the Owner.

B. Final Cleanup; Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from his operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The completed project shall be turned over to the Owner in a neat and orderly condition.
2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the Owner.

E. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor will make his final cleaning and repairing, and any portion of the work finally inspected and accepted by the Engineer shall be kept clean by the Contractor, until the final acceptance of the entire work.
2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, he shall notify the Engineer that he is ready for final inspection of the whole or

a portion of the work, and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer will order further cleaning, repairs, or replacement.

3. When such further cleaning or repairing is completed, the Engineer, upon further notice, will again inspect the work. The "Final Payment" will not be processed until the Contractor has complied with the requirements set forth, and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

F. Project Close Out

1. As construction of the project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to his contract:
 - a. Scheduling equipment manufacturers' visits to site if requested.
 - b. Required testing of project components.
 - c. Scheduling start-up and initial operation.
 - d. Scheduling and furnishing skilled personnel during initial operation.
 - e. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.
 - f. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.
2. Just before the Engineer's Certificate of Substantial Completion is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications and as follows:
 - a. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.
 - b. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces.
3. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the Engineer (or to the Owner if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. 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. Test results of project components.
 - b. Performance Affidavits for equipment.

- c. Certification of equipment or materials in compliance with Contract Documents.
 - d. Operation and maintenance instructions or manuals for equipment.
 - e. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract. Refer to Section 01300, Submittals.
 - f. Any special guarantees or bonds (Submit to Owner).
- 4. The Contractor's attention is directed to the fact that required certifications and information under Item 3 above, must actually be submitted earlier in accordance with other Sections of the Specifications.
 - 5. Refer to Section 01152, Paragraph 1.04, for Preparation of Application for Final Payment.

- END OF SECTION -

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SECTION 01710

CLEANING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Intermediate and final cleaning of Work.

1.02 STORAGE AND HANDLING

- A. Store cleaning products and cleaning wastes in containers specifically designed for those materials.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 CLEANING -- GENERAL

- A. Prevent accumulation of wastes that create hazardous conditions.
- B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.
- C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.
- D. Dispose of degradable debris at an approved solid waste disposal site.
- E. Dispose of nondegradable debris at an approved solid waste disposal site or in an alternate manner approved by Engineer/Owner and regulatory agencies.
- F. Handle materials in a controlled manner with as few handlings as possible.
- G. On completion of work, leave area in a clean, natural looking condition. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.
- H. Do not burn on-site.

3.02 EXTERIOR (SITE) CLEANING

- A. Cleaning During Construction:

1. Construction debris:
 - a. Confine in strategically located container(s):
 - 1) Cover to prevent blowing by wind.
 - 2) Haul from site minimum once a week.
 - b. Remove from work area to container daily.
 2. Soils, sand, and gravel deposited on paved areas and walks:
 - a. Remove daily and as required to prevent muddy or dusty conditions.
 - b. Do not flush into storm sewer system.
- B. Final Cleaning:
1. Remove trash and debris containers from site.
 - a. Re-seed areas disturbed by location of trash and debris containers.
 2. Clean paved roadways to satisfaction of applicable agency.

- END OF SECTION -

SECTION 02100

CLEARING, GRUBBING, AND SITE PREPARATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall be responsible for all site preparation necessary for the work shown on the Drawings and specified herein. This includes, but is not limited to, the proper removal and storage of topsoil, the proper removal and disposal of all spoil and refuse materials, and the removal and re-installation of any items such as driveways, culverts, storm drains, paved ditches, signs, pavements, walks, fences, mailboxes, etc. as may be necessary for carrying out the work.
- B. Principal items of work include:
 - 1. Notifying all authorities owning utility lines running to or on the property. Protecting and maintaining all utility lines to remain and capping those that are not required in accordance with instructions of the Utility Companies, and all other authorities having jurisdiction.
 - 2. Clearing the site within the Limits of Construction (LOC) lines, including removal of grass, brush, shrubs, trees, loose debris and other encumbrances except for trees marked to remain.
 - 3. Boxing and protecting all trees, shrubs, lawns and the like within areas to be preserved. Relocating trees and shrubs, so indicated on the Drawings, to designated areas.
 - 4. Repairing all injury to trees, shrubs, and other plants caused by site preparation operations shall be repaired immediately. Work shall be done by qualified personnel in accordance with standard horticultural practice and as approved by the Engineer.
 - 5. Removing topsoil to its full depth from designated areas and stockpiling on site.
 - 6. Disposing from the site all debris resulting from work under this Section.

1.02 PROTECTION OF PERSONS AND PROPERTY

- A. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians and adjacent property and structures from possible injury and damage.
- B. All conduits, wires, cables and appurtenances above or below ground shall be protected from damage.
- C. Provide warning and barrier fence where shown on the Drawings (and as required for protection of persons or property) and as specified herein.

PART 2 -- PRODUCTS

2.01 WARNING AND BARRIER FENCE

- A. The fence shall be made of a visible, lightweight, flexible, high strength polyethylene material. The fence shall be U-Line S-14713 or equivalent product manufactured by Hanes Geo, Signature Fencing, or approved equal.
- B. Physical Properties

Fence:

Color: Bright Orange

Posts:

ASTM Designation:	ASTM 702
Length:	5 feet long (T-Type)
Weight:	1.25 #/Foot (min)
Area of Anchor Plate:	14 Sq. In.

PART 3 -- EXECUTION

3.01 CLEARING OF SITE

- A. Before removal of topsoil, and start of excavation and grading operations, the areas within the clearing limits shall be cleared and grubbed.
- B. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, fallen timber, brush, bushes, rubbish, sanitary landfill material, fencing, and other perishable and objectionable material within the areas to be excavated or other designated areas. Prior to the start of construction, the Contractor shall survey the entire Contract site and shall prepare a plan which defines the areas to be cleared and grubbed, trees to be pruned, extent of tree pruning, and/or areas which are to be cleared but not grubbed. This plan shall be submitted to the Engineer for approval. Should it become necessary to remove a tree, bush, brush or other plants adjacent to the area to be excavated, the Contractor shall do so only after permission has been granted by the Engineer.
- C. Excavation resulting from the removal of trees, roots and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 02220.
- D. Unless otherwise shown or specified, the Contractor shall clear and grub the full width of the permanent right-of-way under this Contract.
- E. In temporary construction easement locations, only those trees and shrubs shall be removed which are in actual interference with excavation or grading work under this Contract, and removal shall be subject to approval by the Engineer. However, the Engineer reserves the right to order additional trees and shrubs removed at no additional cost to the Owner, if such, in his opinion, are too close to the work to be maintained or have become damaged due to the Contractor's operations.

- F. Where removal of existing structures (such as driveway culverts, storm drains, etc., and/or utilities) is required in order to carry out the work, the Contractor shall be responsible for re-installing these items to their original condition and functional capacity.
- G. The Contractor shall provide adequate means to prevent any sediment from entering any storm drains (curb inlet filter box), ditches, streams, or bodies of water downstream of any area disturbed by construction. Excavated materials shall be placed upstream of any trench or other excavation to prevent sedimentation of offsite area. In areas where a natural buffer area exists between the work area and the closest stream or water course, this area shall not be disturbed. All streets and driveways shall be scraped and swept as necessary (minimum daily) to prevent the accumulation of dirt and debris.

At the completion of the work at this site each day, all debris and excess construction materials shall be removed by the Contractor, and the site shall be left clean and presentable.

- H. Special Site Conditions – The Contractor shall not disturb any areas outside the construction limits designated on the Drawings. Construction disturbances of wetland areas shall be minimized by carefully controlled construction techniques. The site shall be restored to the existing grade after construction and shall be returned to its natural state within a relatively short time period. Under no circumstances shall excess or unsuitable materials be “spread-out” over wetland areas.

3.02 STRIPPING AND STOCKPILING EXISTING TOPSOIL

- A. Existing topsoil and sod on the site within areas designated on the Drawings (wetlands) shall be stripped to whatever depth it may occur (minimum 12 inches), and stored. Topsoil will be replaced prior to final seeding.
- B. The topsoil shall be free of stones, roots, brush, rubbish, or other unsuitable materials before stockpiling the topsoil.
- C. Care shall be taken not to contaminate the stockpiled topsoil with any unsuitable materials.

3.03 GRUBBING

- A. Grubbing shall consist of the removal and disposal of all stumps, roots, logs, sticks and other perishable materials to a depth of at least 6-inches below ground surfaces.
- B. Large stumps located in areas to be excavated shall be removed during grading operations.

3.04 PAVEMENT REMOVAL

- A. Shall consist of the removal and proper disposal of all asphalt or concrete, etc., road surfaces, driveways or sidewalks as may be necessary for carrying out the work.

3.05 DISPOSAL OF MATERIAL

- A. All debris resulting from the clearing and grubbing work shall be disposed of by the Contractor as part of the work of this Contract. Material for disposal shall be taken to and disposed of at an approved landfill site. Material designated by the Engineer to be salvaged

shall be stored on the construction site as directed by the Engineer for reuse in this Project or removal by others.

- B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.
- C. Disposal areas are subject to approval by the Engineer/Owner.
- D. Do not bury organic material on site.
- E. Contractor may chip wood and dispose of on cleared easement when easement is not in the FEMA 100 year flood plain or on landscaped private property.

3.06 WARNING AND BARRIER FENCE

- A. Drive posts 12 to 18 inches into ground every 10' to 12'. Wrap fence material around first terminal post allowing overlap of one material opening. Use metal tie wire or plastic tie wrap to fasten material to itself at top, middle and bottom. At final post, cut with utility knife or scissors at a point halfway across an opening. Wrap around and tie at final post in the same way as the first post.
- B. Use tie wire or tie wrap at intermediate posts and splices as well. Thread ties around a vertical member of the fence material and the post, and bind tightly against the post. For the most secure fastening, tie at top, middle and bottom. Overlap splices a minimum of four fence openings, tie as above, fastening both edges of the fence material splice overlap.

- END OF SECTION -

SECTION 02140

DEWATERING

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, and equipment, perform all work necessary to lower and control the groundwater levels and hydrostatic pressures to permit all excavations and construction to be performed in dry conditions. The work shall include the following:
 - 1. Testing, operation, maintenance, supervision, rewatering, and final dismantling and removal from the site of the dewatering system.
 - 2. The cost of any replacement or rehabilitation of the subgrade or structures damaged due to dewatering system failures or Contractor negligence.
 - 3. Compliance with all regulations relating to this work.
 - 4. The diversion, collection, and removal of all ice, snow and surface runoff from the work areas, and removal of groundwater from new excavations to permit construction in the dry.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Requirements of related work are included in Division 1 and Division 2 of these Specifications.

1.03 REFERENCE SPECIFICATIONS CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents to the extent that the provisions therein are not in conflict with the requirements of this Section.
 - 1. ASTM D1556 Density of soil in place by the Sand Cone Method.
 - 2. ASTM D2167 Density of soil in place by the Rubber Balloon Method.
 - 3. Bureau of Reclamation Groundwater Manual Sediment Test by Imhoff Cone

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals:
 - 1. Name of dewatering subcontractor, if applicable

2. Shop Drawings indicating the following:
 - a. Plans showing the methods and location of dewatering and discharge including a sufficient number of detailed sections to clearly illustrate the scope of work.
 - b. Relationship of the dewatering system, observation wells, and discharge line to existing buildings, other structures, utilities, streets and new construction.
 - c. Utility locations.
 - d. Drawings shall bear the seal and signature of the qualified Registered Professional Engineer in charge of preparing the drawings.
 - e. List of materials and equipment to be used.
 - f. A sample of all well record forms to be maintained during construction.
3. Detailed description of the sequence of dewatering operations
4. Dewatering well installation records indicating an identification number, location, dimensions, and installation procedures and materials.
5. Observation well installation records indicating an identification number, location, dimensions, and installation procedures and materials.
6. Emergency observation plan to be put into operation during failure of the dewatering system
7. Monthly Dewatering System Monitoring Reports containing the following data on approved forms:
 - a. For observation wells, daily piezometric levels shall be identified by date, time, well number and system (subsystem if multiple pumps are used) pumping rate. Piezometric levels shall be noted in feet of drawdown and groundwater elevation.
 - b. For dewatering wells, suspended material test results shall be identified by date, time, well number, well pumping rate (if monitored) and system (subsystem if multiple pumps are used) pumping rate.
 - c. Installation records for new wells.
8. Schedule and records of all maintenance tests for primary and standby dewatering systems including the following:
 - a. Maintenance tests and water quality tests for suspended matter at the discharge point including date, time of day, elapsed times of tests procedures, components tested, suspended particles, resultant observations and well readings.

- b. Daily discharge rates.
 - c. Installation and removal of wells.
 - d. General observations of the system such as equipment running times, and failures.
- 9. Dewatering well removal records
 - 10. Observation well removal records

1.05 QUALITY ASSURANCE

- A. The Contractor shall be solely responsible for the arrangement, location, and depths of the dewatering system necessary to accomplish the work described herein.
- B. Dewatering shall prevent the loss of fines, seepage, boils, quick conditions or softening of the foundation strata while maintaining stability of the sides and bottom of the excavation, and providing dry conditions for construction operations.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Materials, especially the well screen, shall be carefully chosen to be compatible with the environment to prevent erosion, deterioration, and clogging.
- B. Surging of the natural formation to form a "gravel pack" is strictly prohibited.

PART 3 -- EXECUTION

3.01 EXAMINATION OF THE SITE

- A. Become familiar with the surface and subsurface site conditions.
- B. Obtain the data required to analyze the water and soil environment at the site in order to assure that the materials used for the dewatering systems will not erode, deteriorate, clog or otherwise hinder the system's performance during the period of the dewatering.
- C. Prior to the execution of the work, the Contractor, Owner and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

3.02 DESIGN

- A. The dewatering system shall be capable of relieving all hydrostatic pressure against the height of the excavation walls and of lowering the hydrostatic level below the bottom of the base slab a minimum of four (4) feet in the work areas both prior to excavation, and during excavation and construction.

- B. The dewatering system shall be segmented so that if the operation of any one segment is disrupted, the remaining segment plus activated redundant components are capable of maintaining the groundwater at the stated levels.
- C. Provide, operate and maintain all ditches, berms, site grading, sumps and pumping facilities to divert, collect and remove all surface water from work areas. All collected water shall be discharged into the outfall pipe.
- D. Provide pipe and pumps of sufficient size and quantity to be able to flood the excavation within 12 hours in an emergency situation. Restoration of the working area shall be carried out by the Contractor at no additional cost to the Owner.
- E. Carry the dewatering system discharge through pipes out of the area of the excavation into the outfall junction manhole shown on the Drawings. Provide meters to measure the discharge flow.
- F. Place a portion of the header and discharge system underground to provide vehicle crossings or access to existing structure as required.
- G. Provide a standby dewatering system that meets the following requirements:
 - 1. Provide 100 percent standby power.
 - 2. Provide a 15 percent minimum increase in the number of wells and related equipment required to operate the dewatering system installed and ready to operate.
 - 3. Provide a minimum of three separate power units for the standby power system and one installed auxiliary unit for each individually powered pump.
 - 4. Provide separate discharge lines from each well or common lines with valves such that any well or wells that malfunction or are damaged can be isolated from the others.
 - 5. The systems shall be laid out and designed in such a way that portions of the system may be isolated for routine maintenance or repair in case of accidental damage without affecting the normal operation of the system.
- H. Provide sufficient fuel to maintain a five day supply on site for fuel power systems.
- I. Provide observation wells to determine compliance with dewatering requirements as indicated on the Drawings, Shop Drawings, and the Engineer.
- J. Designate certain observation wells as emergency observation wells.

3.03 INSPECTION

- A. All tests and inspections require the witnessing and written approval of the Owner and Engineer.
- B. Provide safe access for the owner and Engineer to perform testing and inspection.

- C. The Owner and Engineer will provide oral and written notice to the Contractor for all tests and inspections that do not meet approval.

3.04 INSTALLATION AND TESTING

- A. Install the dewatering system from the existing ground surface or from the bottom of an excavation which is located above the natural groundwater level.
- B. Pump each well individually at its maximum or design flow and take a water sample using the following procedures:
 - 1. Obtain samples from stopcocks located along the discharge lines at points of high turbulence or between 4 and 8 o'clock on the perimeter of straight sections of pipe.
 - 2. Flush the stopcock for a few seconds before taking a sample.
 - 3. Take a 1 liter sample with the stopcock fully open.
- C. Test the sample following the Sediment Test by Imhoff Cone for two to three minutes and measure the volume of settled materials to the nearest 0.01 milliliters (0.01 milliliters = 10 ppm).
- D. All wells shall be evaluated as follows:
 - 1. Wells producing 10 ppm or less shall be accepted.
 - 2. Wells producing between 10 and 20 ppm may be accepted by the Engineer based on the evaluation of average ppm for all wells, ppm of adjacent wells, and total quantity of water which is actually pumped to dewater the excavation.
 - 3. Well producing more than 20 ppm shall be abandoned and backfilled.
- E. Observation wells shall consist of a standpipe or riser of minimum 1.0-inch inside diameter and a minimum three (3) foot long well-point screen or slotted PVC section at the bottom. Observation wells shall be installed as follows:
 - 1. Employ the jetting method for all observation wells except those within ten feet of existing structures, piping or utilities.
 - 2. Employ Case Boring Techniques for all observation wells within ten feet of existing structures, piping, or utilities and backfill the annulus between the well point or riser and the natural soil with a free flowing granular material similar to Ottawa Sand.
- F. Test observation wells by adding or removing water from the riser to demonstrate their proper functioning.

3.05 DEWATERING PROCEDURE

- A. Following soldier pile installation and dewatering system installation and testing and prior to excavation, place the dewatering system into operation and lower the water level.

- B. Schedule the dewatering work to coordinate with all the other related work such as excavation, sheeting and tiebacks, pouring of concrete walls and slabs, and any other operations by other Contractors that might be affected by this work.
- C. Test the standby dewatering system with the following procedures:
 - 1. Shut off the primary power source and demonstrate that the standby power can be activated prior to the groundwater level rising to within one (1) foot of the bottom of base slab elevation and that the standby power source is adequate to draw the groundwater level back down to the Contractor's design depth or to the minimum required depths.
 - 2. Shut off one segment of the system and show that redundant components can be activated prior to the groundwater level rising to within one (1) foot of the bottom of base slab elevation and that the system is adequate to draw the groundwater level back down to the Contractor's design depth or to the minimum required depths.
 - 3. If the dewatering system fails to meet either performance requirement, the Contractor shall draw the groundwater level to a greater depth, add wells, or modify the system such that it will be in conformance with these requirements when retested.
- D. Operate the dewatering system continuously twenty-four (24) hours per day, seven (7) days per week until all structures have been satisfactorily constructed, including placement of fill materials, and no longer require dewatering.

3.06 MONITORING

- A. Measure the piezometric water levels to the nearest one-tenth foot in all observation wells and submit the readings daily.
- B. Measure the concentration of suspended material in the discharge water of each well once every two days. Wells which exceed the acceptable level of solids concentration shall be replaced.
- C. Test the performance of the standby system and all components by demonstrating that the system is operational at least every two weeks.
- D. Test the observation wells every two weeks by adding and removing water from the risers to demonstrate their proper functioning.
- E. Observation wells that become inoperable shall be immediately replaced while construction is halted if the Engineer determines that the observation well is critical.
- F. Remove and add riser pipe of each observation well located within the excavation as construction progresses until the well conflicts with the structure. When the conflict occurs, abandon the observation well, fill it with grout, and cut the riser off at grade.
- G. In the event of a dewatering system failure, take the following steps:
 - 1. Conduct in situ density tests conforming to ASTM D1556 or ASTM D2167 immediately above and at the structure founding grades.

2. Remove all soils that show unacceptable density and replace them with compacted fill as indicated in Section 02200, Earthwork.
3. Test the repaired soils as required by the Owner and Engineer to verify that they have been returned to their original in situ state or better.
4. Repair or replace damaged structures.

3.07 REWATERING AND REMOVAL OF DEWATERING SYSTEM

- A. Obtain written approval from the Owner and Engineer to begin rewatering operations.
- B. Provide an adequate weight of fill to prevent buoyancy.
- C. Pump water into the excavation such that the water level inside the excavation is always at a higher level than the rising groundwater on the outside until the groundwater level has reached its static level.
- D. Remove all dewatering wells, buried and surface piping, cables, pump foundations, structural supports and all other support facilities.
- E. Backfill as specified in Section 02200, Earthwork, all trenches and excavations below final grades or in fill areas.
- F. Provide documentation of dewatering and observation well removal including the date of removal, well number, location, procedures, and materials used.

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SECTION 02160

TEMPORARY SHEETING AND BRACING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, materials and equipment to install steel sheet piling where shown on the Contract Drawings or required.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

- 1. Standard Building Code
- 2. ASTM A328 - Standard Specification for Steel Sheet Piling
- 3. OSHA regulations Subpart P of Part 1926 in the federal register.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Two (2) copies of mill test reports certifying that materials meet ASTM requirements.
 - 2. Photographs of existing structures adjacent to work area.
 - 3. Survey of existing structures adjacent to work area.
 - 4. Sample driving record forms.
 - 5. Schedule of Procedures and Operations.
 - 6. Details of pile driving equipment.
 - 7. Shop Drawings showing shades, sizes, dimensions and details of all bracing.
 - 8. Contractor qualifications.
 - 9. Design calculations showing design loads and stresses. Calculations shall be signed and sealed by a licensed Professional Engineer currently registered in the State of North Carolina.
 - 10. Driving Records.

11. Log of surveyed elevations.

1.04 GENERAL

- A. Trenches and other excavations shall be properly sheeted and braced where necessary to keep excavations within the easement/Right-of-Way limits, or other limits shown on the Drawings, prevent shifting of materials, damage to pavements, structures, pipe and utilities, and to provide safe working conditions. All sheeting shall be in accordance to the requirements of the State of North Carolina labor laws. The Contractor shall be responsible for the adequacy of all sheeting and bracing used and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it. Furnishing, placing and withdrawal of all sheeting (if required) shall be included in the Unit Price of the pipe.
- B. The Contractor shall submit detailed plans of sheeting and bracing 'For Information Only' to the Engineer before approval is given to proceed. If the Engineer is of the opinion that sufficient or proper supports have not been provided, he may order additional supports be put in at the expense of the Contractor.
- C. All sheeting and bracing in excavations shall be withdrawn as the refilling is being done, unless otherwise shown on the Drawings. Where sheeting and bracing is to be removed, it shall be carefully pulled to prevent damage to the structure or pipe. Voids remaining after sheeting has been pulled shall be filled with suitable material as approved by the Engineer. The Engineer may order the whole or a part of such sheeting and bracing to be left in place or he may permit it to be left in place at the request and expense of the Contractor. Unless otherwise directed, all sheeting and bracing left in place shall be cut off at least 2-feet below the finished surface of the ground or pavement.

1.05 QUALITY ASSURANCE

- A. The Contractor shall have at least three (3) years of experience in driving sheet pile and shall have completed at least three (3) installations.
- B. The Contractor shall be responsible for the adequacy of all sheeting and bracing and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it.

PART 2 -- PRODUCTS

2.01 MATERIALS

- A. Sheeting shall conform to the requirements of ASTM A328. Sheet piles shall be new and shall be of the continuous interlock type of the section, length and weight shown on the Contract Drawings.
- B. Walers, braces, structures, tie-rod assemblies, plates and similar members shall conform to the requirements of ASTM A36.
- C. Bolts, nuts and washers shall conform to the requirements of ASTM A307.

PART 3 -- EXECUTION

3.01 SCHEDULE OF PROCEDURES AND OPERATIONS

- A. Schedule shall be submitted prior to commencing sheeting installation.
- B. Schedule shall include proposed method of installation, sequence of all sheeting driving operations, catalog data and manufacturer's specification for all hammers and anvils to be used and method of lifting, handling, driving and cutting of sheeting.
- C. Schedule submission does not relieve the Contractor of his responsibility for the successful completion of the work.

3.02 CONFIGURATION AND EXTENT

- A. Extent of the sheeting and bracing is indicated on the Drawings and includes, but is not limited to, the following:
 - 1. Sheeting and bracing necessary to protect existing structures, roads, walkways, utilities, and other improvements against loss of ground or caving embankments without producing damage to the adjacent building structures, roads, and/or utilities, and to provide safe working conditions.
 - 2. Maintenance of the sheeting and support systems.
 - 3. Removal and/or relocation of sheeting and bracing as required.
- B. The configurations of the sheeting may include but are not limited to the following:
 - 1. Steel sheet piling with walers and struts
 - 2. Tied back steel sheet piling

3.03 FABRICATION

- A. Sheeting shall be so fabricated that when driven in place, it will form a continuously interlocked wall for each structure to the extent shown on the Drawings. Sheeting shall be fabricated in one continuous length equal to that shown on the Contract Drawings.
- B. Walers and braces may be prefabricated or fabricated in place.

3.04 INSTALLATION

- A. Sheeting shall be carefully located and driven in a plumb position, each sheet pile interlocking with the adjacent sheet pile so as to form a single continuous wall. Pile hammers shall be maintained in proper alignment during driving operations. A suitable guide system shall be used to permit the sheeting to be driven plumb and on-line. Any obstructions encountered in driving the steel sheet piling shall be removed or otherwise disposed of so as to permit the proper installation of the sheeting. Any sheeting which at any time becomes damaged, displaced, separated from adjacent sheets or otherwise injured, shall be withdrawn and replaced with new sheeting at the expense of the Contractor.

- B. Equipment: The Contractor shall provide and maintain in good operating condition, all equipment necessary for the proper and efficient handling and installation of the sheet piles. The Contractor shall have all major equipment items available for observation by the Engineer. Any deficiencies in quality, quantity or type of equipment shall be corrected prior to commencing work and such correction shall be a required condition to properly fulfill the Contract. This inspection and subsequent approval shall in no way relieve the Contractor from his obligation to provide all equipment required to properly perform the work.
- C. Hammers: Pile hammers shall be steam, diesel, or air driven impact hammers. Vibratory type hammers shall NOT be used. Hammers shall be maintained in good operating condition and shall be operated at the manufacturer's rated number of blows per minute. The lower end of the hammer shall be fitted with an anvil base that is built to fit the top of the sheeting under the center of the hammer during driving.
- D. Driving Records: Sheeting shall be driven only in the presence of the Engineer. The Contractor shall provide a qualified individual to compile and turn over to the Engineer a daily record of driving data. The complete record of each day's activity shall include the number of sheets installed, the length of each, equipment and personnel utilized, and general remarks regarding the day's activity.
- E. The Contractor shall exercise caution in the installation and removal of sheeting to insure that excessive or unusual loadings are not transmitted to any new or existing structures. The Contractor shall promptly repair at this expense any and all damage that can be reasonably attributed to sheeting installation or removal.

3.05 MONITORING

- A. Before starting work, the Contractor shall check and verify governing dimensions and elevations. In company with the Engineer, he shall jointly survey the condition of adjoining structures. He shall take photographs, recording any prior settlement or cracking of structures, pavements, and other improvements. He shall prepare a list of such damages, verified by dated photographs, and signed by the Contractor.
- B. The Contractor shall survey adjacent structures and improvements, establishing exact elevations at fixed points to act as bench marks. He shall clearly identify bench marks and record existing elevations. Datum level used to establish bench mark elevations shall be located at a sufficient distance so as not to be affected by movement resulting from excavation or construction operations.

3.06 REMOVAL

- A. All sheeting and bracing shall be removed upon completion of the work except as indicated herein. The Engineer may permit sheetings to be left in place at the request and expense of the Contractor. The Engineer may order certain sheetings left permanently in place. Any sheeting or bracing left in place shall be cut off at least two (2) feet below the finished ground surface or as directed by the Engineer.
- B. The Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when sheeting is removed. If significant volumes of soil cannot be prevented from clinging to the extracted sheets, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth

below subgrade that sheeting will be driven in similar soil conditions or employ other appropriate means to prevent loss of support.

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SECTION 02200

EARTHWORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, equipment and materials required to complete all work associated with excavation, including off-site borrow excavation, dewatering, backfill, drainage layers beneath and around structures, foundation and backfill stone, filter fabric, embankments, stockpiling topsoil and any excess suitable material in designated areas, in place compaction of embankments, backfill and subgrades beneath foundations and roadways, excavation support, disposing from the site all unsuitable materials, providing erosion and sedimentation control grading, site grading and preparation of pavement and structure subgrade, and other related and incidental work as required to complete the work shown on the Drawings and specified herein.
- B. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Drawings or established by the Engineer.
- C. It is the intent of this Specification that the Contractor conduct the construction activities in such a manner that erosion of disturbed areas and off-site sedimentation be absolutely minimized.
- D. All work under this Contract shall be done in conformance with and subject to the limitations of the latest editions of the North Carolina Department of Transportation Standard Specifications for Roads and Structures and the North Carolina Erosion and Sediment Control Planning and Design Manual

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Requirements of related work are included in Division 1 and Division 2 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced Specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest edition.
 - 2. American Society for Testing and Materials (ASTM):
 - ASTM C 127 Test for Specific Gravity and Absorption of Coarse Aggregate.
 - ASTM C 136 Test for Sieve Analysis of Fine and Coarse Aggregates.

ASTM D 422	Particle Size Analysis of Soils.
ASTM D 423	Test for Liquid Limit of Soils.
ASTM D 424	Test for Plastic Limit and Plasticity Index of Soils.
ASTM C 535	Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM D 698	Standard Method of Test for the Moisture - Density Relations of Soils Using a 5.5 lb. (2.5 kg) Rammer and a 12-inch (305 mm) Drop.
ASTM D1556	Test for Density of Soil in Place by the Sand-Cone Method.
ASTM D1557	Test for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lbs. (4.5 kg) Rammer and 18-inch (457 mm) Drop.
ASTM D2049	Test Method for Relative Density of Cohesionless Soils.
ASTM D2167	Test for Density of Soil in Place by the Rubber-Balloon Method.
ASTM D2216	Test for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
ASTM D2487	Test for Classification of Soils for Engineering Purposes.
ASTM D2922	Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.04 SUBSURFACE CONDITIONS

- A. Information on subsurface conditions is referenced under Division 1, General Requirements.
- B. Attention is directed to the fact that there may be water pipes, storm drains and other utilities located in the area of proposed excavation. Perform all repairs to same in the event that excavation activities disrupt service.

1.05 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01300 - Submittals, the Contractor shall submit the following:
 1. Name and location of all material suppliers.
 2. Certificate of compliance with the standards specified above for each source of each material.
 3. List of disposal sites for waste and unsuitable materials and all required permits for use of those sites.

4. Plans and cross sections of open cut excavations showing side slopes and limits of the excavation at grade.
5. Samples of synthetic filter fabric and reinforced plastic membrane with manufacturer's certificates or catalog cuts stating the mechanical and physical properties. Samples shall be at least one (1) foot wide and four (4) feet long taken across the roll with the warp direction appropriately marked.
6. Construction drawings and structural calculations for any types of excavation support required. Drawings and calculations shall be sealed by a currently registered Professional Engineer in the State of North Carolina.
7. Monitoring plan and pre-construction condition inspection and documentation of all adjacent structures, utilities, and roadways near proposed installation of excavation support systems.
8. Dewatering procedures.

1.06 PRODUCT HANDLING

- A. Soil and rock material shall be excavated, transported, placed, and stored in a manner so as to prevent contamination, segregation and excessive wetting. Materials which have become contaminated or segregated will not be permitted in the performance of the work and shall be removed from the site.

1.07 USE OF EXPLOSIVES

- A. Blasting shall be permitted on this project, upon approval from all required regulatory authorities. Refer to Section 02202, Excavation by Blasting for more details.

PART 2 -- PRODUCTS

2.01 SELECT FILL

- A. Soils from the excavations meeting requirements stipulated herein with the exceptions of topsoil and organic material may be used as select fill for backfilling, constructing embankments, reconstructing existing embankments, and as structural subgrade support.
- B. Select fill used for embankment construction shall be a silty or clayey soil material with a Maximum Liquid Limit (LL) of 50 and a Plasticity Index (PI) between 7 and 20.
- C. Select fill used for backfilling shall either be material as described in Paragraph B above or a granular soil material with a Maximum Plasticity Index (PI) of 6.
- D. Regardless of material used as select fill, materials shall be compacted at a moisture content satisfactory to the Engineer, which shall be approximately that required to produce the maximum density except that the moisture content shall not be more than 1% below nor more than 4% above the optimum moisture content for the particular material tested in accordance with the ASTM D698.

- E. Select fill used as subgrade support shall be a coarse aggregate material meeting the gradation requirements of #57 or #78 aggregates in accordance with ASTM C-33, or Aggregate Base Course (ABC) as defined in Section 02207 – Aggregate Materials.
- F. Where excavated material does not meet requirements for select fill, Contractor shall furnish off-site borrow material meeting the specified requirements herein. Determination of whether the borrow material will be paid for as an extra cost will be made based on Article 4 of the General Conditions, as amended by the Supplementary Conditions. When the excavated material from required excavations is suitable for use as backfill, bedding, or embankments, but is replaced with off-site borrow material for the Contractor's convenience, the costs associated with such work and material shall be borne by the Contractor.

2.02 TOPSOIL

- A. Topsoil shall be fertile, natural soil, free from large stones, roots, sticks and weeds with a neutral pH. It shall contain no mixture of refuse or any material toxic to plant growth. Topsoil from off-site sources shall also have a minimum of 80% passing No. 4 sieve, a maximum of 80% passing a No. 200 sieve, minimum of 5% organic content and a pH between 6 and 7.

2.03 GEOTEXTILES

- A. The Contractor shall provide geotextiles as indicated on the Drawings and directed by the ENGINEER.

PART 3 -- EXECUTION

3.01 STRIPPING OF TOPSOIL

- A. In all areas to be excavated, filled, paved, or graveled the topsoil shall be stripped to its full depth and shall be deposited in storage piles on the site, at locations designated by the Engineer, for subsequent reuse. Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable materials.

3.02 EXCAVATION

- A. All material excavated, except for rock, shall be classified as UNCLASSIFIED EXCAVATION. Excavation shall include the removal of all soil, conduits, pipe, and all other obstacles encountered and shown to be removed within the limits of excavation shown on the Drawings or specified herein. The cost of excavation shall be included in unit price pay items for the new gravity sewer and manholes. Solid rock excavation shall be paid as a unit price under its own pay item description.
- B. All suitable material removed in the excavation shall be used as far as practicable in the formation of embankments, subgrades, and shoulders, and at such other places as may be indicated on the Drawings or indicated by the Engineer. No excavation shall be wasted except as may be permitted by the Engineer. Refer to the drawings for specific location and placement of suitable excavated materials in the formation of embankments, backfill, and structural and roadway foundations. THE ENGINEER WILL DESIGNATE MATERIALS THAT ARE UNSUITABLE. The Contractor shall furnish off site disposal areas for the unsuitable material. Where suitable materials containing excessive moisture are

encountered above grade in cuts, the Contractor shall construct above grade ditch drains prior to the excavation of the cut material when in the opinion of the Engineer such measures are necessary to provide proper construction.

- C. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such excavation support, pumping and drainage as may be required. Excavation shall be made in accordance with the grades and details shown on the Drawings and as specified herein.
- D. Excavation slopes shall be flat enough to avoid slides that will cause disturbance of the subgrade or damage of adjacent areas. Excavation requirements and slopes shall be as indicated in the Drawings. The Contractor shall intercept and collect surface runoff both at the top and bottom of cut slopes. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded as shown on the Drawings or as may be indicated by the Engineer. Concurrent with the excavation of cuts the Contractor shall construct intercepting berm ditches or earth berms along and on top of the cut slopes at locations shown on the Drawings or designated by the Engineer. All slopes shall be finished to reasonably uniform surfaces acceptable for seeding and mulching operations. No rock or boulders shall be left in place which protrude more than 1 foot within the typical section cut slope lines, and all rock cuts shall be cleaned of loose and overhanging material. All protruding roots and other objectionable vegetation shall be removed from slopes. The Contractor shall be required to submit plans of open-cut excavation for review by the Engineer before approval is given to proceed.
- E. It is the intent of these Specifications that all structures shall bear on an aggregate base, crushed stone or screened gravel bedding placed to the thickness shown on the Drawings, specified in these Specifications, or not less than 6-inches. Bedding for gravity sewer piping shall be as shown on the Drawings.
- F. The bottom of all excavations for structures and pipes shall be examined by the Engineer for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer, additional excavation is required due to the low bearing value of the subgrade material, or if the in-place soils are soft, yielding, pumping and wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, and/or crushed stone or screened gravel as indicated by the Engineer. Payment for such additional work ordered by the Engineer shall be made under a separate unit price pay item. No payment will be made for subgrade disturbance caused by inadequate dewatering or improper construction methods.
- G. All cuts shall be brought to the grade and cross section shown on the Drawings, or established by the Engineer, prior to final inspection and acceptance by the Engineer.
- H. Slides and overbreaks which occur due to negligence, carelessness or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as indicated by the Engineer at no additional cost to the Owner. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed.
- I. Where the excavation exposes sludge, sludge contaminated soil or other odorous materials, the Contractor shall cover such material at the end of each workday with a minimum of

6-inches and a maximum of 24-inches of clean fill. The work shall be an odor abatement measure and the material shall be placed to the depth deemed satisfactory by the Engineer for this purpose.

3.03 EXCAVATION SUPPORT

- A. The Contractor shall furnish, place, and maintain such excavation support which may be required to support sides of excavation or to protect pipes and structures from possible damage and to provide safe working conditions. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports put in at the expense of the Contractor. The Contractor shall be responsible for the adequacy of all supports used and for all damage resulting from failure of support system or from placing, maintaining and removing it.
- B. Selection of and design of any proposed excavation support systems is exclusively the responsibility of the Contractor. Contractor shall submit drawings and calculations on proposed systems sealed by a Professional Engineer currently registered in the State of North Carolina.
- C. The Contractor shall exercise caution in the installation and removal of supports to insure that excessive or unusual loadings are not transmitted to any new or existing structure. The Contractor shall promptly repair at his expense any and all damage that can be reasonably attributed to installation or removal of excavation support system.
- D. Contractor shall monitor movement in the excavation support systems as well as movement at adjacent structures, utilities and roadways near excavation supports. Contractor shall submit a monitoring plan developed by the excavation support design engineer. All pre-construction condition assessment and documentation of adjacent structures on-site and off-site shall be performed by the Contractor. If any sign of distress such as cracking or movement occurs in any adjacent structure, utility or roadway during installation of supports, subsequent excavation, service period of supports, subsequent backfill and construction, or removal of supports, Engineer shall be notified immediately. Contractor shall be exclusively responsible for any damage to any roadway, structure, utility, pipes, etc. both on-site and off-site, as a result of his operations.
- E. All excavation supports shall be removed upon completion of the work except as indicated herein. The Engineer may permit supports to be left in place at the request and expense of the Contractor. The Engineer may order certain supports left permanently in place in addition to that required by the Contract. The cost of the materials so ordered left in place, less a reasonable amount for the eliminated expense of the removal work omitted, will be paid as a Change Order in accordance with the General Conditions and Division 1. Any excavation supports left in place shall be cut off at least two (2) feet below the finished ground surface or as directed by the Engineer.

3.04 PROTECTION OF SUBGRADE

- A. To minimize the disturbance of bearing materials and provide a firm foundation, the Contractor shall comply with the following requirements:
 - 1. Use of heavy rubber-tired construction equipment shall not be permitted on the final subgrade unless it can be demonstrated that drawdown of groundwater throughout the entire area of the structure is at least 3 feet below the bottom of the excavation

(subgrade). Even then, the use of such equipment shall be prohibited should subgrade disturbance result from concentrated wheel loads.

2. Subgrade soils disturbed through the operations of the Contractor shall be excavated and replaced with compacted select fill or crushed stone at the Contractor's expense as indicated by the Engineer.
3. The Contractor shall provide positive protection against penetration of frost into materials below the bearing level during work in winter months. This protection can consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other acceptable means.

3.05 PROOFROLLING

- A. The subgrade of all structures and all areas that will support pavements or select fill shall be proofrolled. After stripping of topsoil, excavation to subgrade and prior to placement of fills, the exposed subgrade shall be carefully inspected by probing and testing as needed. Any topsoil or other organic material still in place, frozen, wet, soft, or loose soil, and other undesirable materials shall be removed. The exposed subgrade shall be proofrolled with a heavily loaded tandem-wheeled dump truck to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed shall be removed and replaced with an approved compacted material.
- B. The Contractor shall perform all dewatering as required for the completion of the work. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review prior to any earthwork operations. All water removed by dewatering operations shall be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.
- C. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction and reconstruction, subgrade preparation, and to allow concrete and piping to be placed in a dry condition. The system shall include a sump system or other equipment, appurtenances and other related earthwork necessary for the required control of water. The Contractor shall drawdown groundwater in order to maintain a dry and undisturbed condition.
- D. The Contractor shall control, by acceptable means, all water regardless of source. Water shall be controlled and its disposal provided for at each berm, structure, etc. The entire periphery of the excavation areas shall be ditched and diked to prevent water from entering the excavation. The Contractor shall be fully responsible for disposal of the water and shall provide all necessary means at no additional expense to the Owner. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.
- E. The Contractor shall be responsible for and shall repair without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area. The Contractor shall be responsible for damages to any other area or structure caused by his failure to maintain and operate the dewatering system proposed and installed by the Contractor.

- F. The Contractor shall take all the steps that he considers necessary to familiarize himself with the surface and subsurface site conditions, and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering. Copies of logs of borings and laboratory test results are available to the Contractor. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom by the Contractor.
- G. Prior to the execution of the work, the Contractor, Owner and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

3.06 DEWATERING

- A. The Contractor shall perform all dewatering as required for the completion of the work. All water removed by dewatering operations shall be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.
- B. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- C. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.
- D. Refer to Section 02140, Dewatering, for additional details and requirements.

3.07 EMBANKMENTS

- A. The Contractor shall perform the construction of embankments in such a manner that cut and fill slopes will be completed to final slopes and grade in a continuous operation. The operation of removing excavation material from any cut and the placement of embankment in any fill shall be a continuous operation to completion unless otherwise permitted by the Engineer.
- B. Surfaces upon which embankments are to be constructed shall be stripped of topsoil, organic material, rubbish and other extraneous materials. After stripping and prior to placing embankment material, the Contractor shall compact the top 12-inches of in place soil as specified under Paragraph 3.09, COMPACTION.
- C. Any soft or unsuitable materials revealed before or during the in place compaction shall be removed as indicated by the Engineer and replaced with select fill.
- D. Ground surfaces on which embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the embankment with the existing surface. The embankment soils shall be as specified under Part 2 - Products, and shall be deposited and spread in successive, uniform, approximately horizontal layers not exceeding 8-inches in compacted depth for the full width of the cross section, and shall be kept approximately level by the use of effective spreading equipment. Hauling shall be distributed over the full width of the embankment, and in no case will deep ruts be allowed to form during the construction of the embankment. The embankment shall be properly drained at all times. Each layer of

the embankment shall be thoroughly compacted to the density specified under Paragraph 3.09, COMPACTION.

- E. The embankment or fill material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. Wetting or drying of the material and manipulation when necessary to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on all portions of the embankment thus affected shall be delayed until the material has dried to the required moisture content. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals. From these tests, corrections, adjustments, and modifications of methods, materials, and moisture content will be made to construct the embankment.
- F. Where embankments are to be placed and compacted on hillsides, or when new embankment is to be compacted against embankments, or when embankment is built in part widths, the slopes that are steeper than 4:1 shall be loosened or plowed to a minimum depth of 6 inches or, if in the opinion of the Engineer, the nature of the ground is such that greater precautions should be taken to bind the fill to the original ground then benches shall be cut in the existing ground as indicated by Engineer.
- G. When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portions of the embankments and the other material which meets the requirements for select fill shall be incorporated into the formation of the embankments. Stones or fragmentary rock larger than 4-inches in their greatest dimension will not be allowed within the top 6-inches of the final grade. Stones, fragmentary rock, or boulders larger than 12-inches in their greatest dimension will not be allowed in any portions of embankments and shall be disposed of by the Contractor as indicated by the Engineer. When rock fragments or stone are used in embankments, the material shall be brought up in layers as specified or directed and every effort shall be exerted to fill the voids with finer material to form a dense, compact mass which meets the densities specified for embankment compaction.

3.08 BACKFILLING

- A. All structures and pipes shall be backfilled with the type of materials shown on the Drawings and specified herein. Select fill shall be deposited in successive, uniform, approximately horizontal layers not exceeding 8-inches in compacted depth for the full width. Stones or fragmentary rock larger than 4-inches in their greatest dimension will not be allowed within the top 6-inches of the ground nor within 6 inches of pipes. No stone or fragmentary rock larger than 12-inches in their greatest dimension will be allowed for any portion of backfill. Compaction shall be in accordance with the requirements of Paragraph 3.09, COMPACTION.
- B. Where excavation support is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when supports are removed. If significant volumes of soil cannot be prevented from clinging to the extracted supports, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that supports will be installed in similar soil conditions or employ other appropriate means to prevent loss of support.

3.09 COMPACTION

- A. The Contractor shall compact embankments, backfill, crushed stone, aggregate base, and in place subgrade in accordance with the requirements of this Section. The densities specified herein refer to percentages of maximum density as determined by the noted test methods. Compaction of materials on the project shall be in accordance with the following schedule:

	Density % Std. Proctor (D698)	Density % Mod. Proctor (D1557)	Max. Lift Thickness as Compacted Inches
Embankments Beneath Structures*	98	95	8
Other Embankments	95	92	8
Backfill Around Structures	95	92	8
Backfill in Pipe Trenches	90	87	8
Crushed Stone Beneath Structures	**	**	12
Select Sand	--	98	8
Aggregate Base Course (ABC) Beneath Pavements and Structures	--	98	8
Crushed Stone Backfill	**	**	12
Crushed Stone Pipe Bedding	**	**	12
In place Subgrade Beneath Structures	98	95	Top 12-inches

* Embankments beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45° slope.

** The aggregate shall be compacted to a degree acceptable to the Engineer by use of a vibratory compactor and/or crawler tractor.

- B. Field density tests will be made by the Owner and Engineer to determine if the specified densities have been achieved, and these tests shall be the basis for accepting or rejecting the compaction. In-place density tests will be performed in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. The Owner and Engineer will exclusively determine which test method will be the most appropriate. Failure to achieve the specified densities shall require the Contractor to re-compact the material or remove it as required. The Contractor shall, if necessary, increase his compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the thickness of the layers. The Contractor shall adjust the moisture contents of the soils to bring them within the optimum range by drying them or adding water as required.
- C. Testing will be performed as frequently as deemed necessary by the Engineer. As a minimum, one in-place density test shall be performed for each 1000 cubic yards of embankment placed and 500 cubic yards of backfill placed or one test performed each day for either.

3.10 REMOVAL OF UNSUITABLE MATERIALS

- A. The Contractor shall remove and dispose of off-site all unsuitable materials. Within thirty (30) consecutive days after Notice to Proceed, the Contractor shall submit to the Engineer for review all required permits and a list of disposal sites for the unsuitable materials. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.
- B. All unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state and local laws and regulations.
- C. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.
- D. All unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust.
- E. When all unsuitable material is completely disposed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner and Owner(s) of the disposal site(s).

3.11 BORROW EXCAVATION

A. Description

The work covered by this section consists of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the Drawings or directed by the Engineer. It shall also include the removing, stockpiling, and replacement of topsoil on the borrow source; the satisfactory disposition of material from the borrow source which is not suitable for use; and the satisfactory restoration of the borrow source and haul roads to an acceptable condition upon completion of the work.

Borrow excavation shall not be used before all available suitable unclassified excavation has been used for backfill and incorporated into the embankments.

B. Coordination with Seeding Operations

The Contractor shall coordinate the work covered by this section with the construction of embankments so that the requirements of Section 02200 are met.

C. Materials

All material shall meet the requirements of Division 2 shown below:

Borrow MaterialSection 02200, Subsection 2.01 - Select Fill

D. Construction Methods

1. General

The surface of the borrow area shall be thoroughly cleared and grubbed and cleaned of all unsuitable material including all organics, topsoil, etc., before beginning the excavation. Disposal of material resulting from clearing and grubbing shall be in accordance with Section 02100.

Each borrow operation shall not be allowed to accumulate exposed, erodible slope area in excess of 1 acre at any one given time without the Contractor's beginning permanent seeding and mulching of the borrow source or other erosion control measures as may be approved by the Engineer.

The topsoil shall be removed and stockpiled at locations that will not interfere with the borrow operations and that meet the approval of the Engineer. Temporary erosion control measures shall be installed as may be necessary to prevent the erosion of the stockpile material. Once all borrow has been removed from the source or portion thereof, the stockpiled topsoil shall be spread uniformly over the source.

Where it is necessary to haul borrow material over existing roads, the Contractor shall use all necessary precautions to prevent damage to the existing roads. The Contractor shall also conduct his hauling operations in such a manner as to not interfere with the normal flow of traffic and shall keep the traffic lanes free from spillage at all times.

2. Owner Furnished Sources

Where borrow sources are furnished by the Owner the location of such sources will be as designated on the Drawings or as directed by the Engineer.

The Owner will furnish the necessary haul road right-of-way at locations designated by the Engineer. All haul roads required shall be built, maintained, and when directed by the Engineer, obliterated, at no cost to the Owner. Where the haul road is to be reclaimed for cultivation the Contractor shall plow or scarify the area to a minimum depth of 8 inches.

The borrow sources shall be left in a neat and presentable condition after use. All slopes shall be smoothed, rounded, and constructed not steeper than 3:1. Where the source is to be reclaimed for cultivation the source shall be plowed or scarified to a minimum depth of 8 inches, disc harrowed, and terraces constructed. The source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided.

All sources shall be seeded and mulched in accordance with Section 02910.

3. Contractor Furnished Sources

Prior to the approval of any off-site borrow source(s) developed for use on this project, the Contractor shall obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the removal of the borrow material from the borrow source(s) will have no effect on any known district, site building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. A copy of this certification shall be furnished to the Engineer prior to performing any work on the proposed borrow source.

The approval of borrow sources furnished by the Contractor shall be subject to the following conditions:

- a. The Contractor shall be responsible for acquiring the right to take the material and any rights of access that may be necessary; for locating and developing the source; and any clearing and grubbing and drainage ditches necessary.

Such right shall be in writing and shall include an agreement with the Owner that the borrow source may be dressed, shaped, seeded, mulched, and drained as required by these Specifications after all borrow has been removed.

- b. Except where borrow is to be obtained from a commercial source, the Contractor and the property owner shall jointly submit a borrow source development, use, and reclamation plan to the Engineer for his approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary. The Contractor's plan shall address the following:

- (1) Drainage

The source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided. If drainage is not practical, and the source is to serve as a pond, the minimum average depth below the water table shall be 4 feet or the source graded so as to create wetlands as appropriate.

- (2) Slopes

The source shall be dressed and shaped in a continuous manner to contours which are comparable to and blend in with the adjacent topography, but in no case will slopes steeper than 3:1 be permitted.

- (3) Erosion Control

The plan shall address the temporary and permanent measures that the Contractor intends to employ during use of the source and as a part of the reclamation. The Contractor's plan shall provide for the use of staged permanent seeding and mulching on a continual basis while the source is in use and the immediate total reclamation of the source when no longer needed.

4. Maintenance

During construction and until final acceptance the Contractor shall use any methods approved by the Engineer which are necessary to maintain the work covered by this section so that the work will not contribute to excessive soil erosion.

- END OF SECTION -

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SECTION 02202

EXCAVATION BY BLASTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, equipment and materials required to drill, blast, loosen, excavate, and dispose material to complete the work shown on the Drawings and specified herein. Contractor shall also be responsible for blast monitoring as specified in Paragraph 3.02 herein.

- B. The work shall include, but not be limited to:
 - 1. Blast round design.
 - 2. Planning and execution of appropriate site-specific safety measures to be employed during all blasting operations, and the safe handling and storage of high explosives and blasting agents.
 - 3. Drilling blast holes, loading blast holes with explosives, and wiring and safe detonation of blast rounds.
 - 4. Removal from the site of all excess excavated soil, debris, and rock as indicated in the contract Documents, or as directed by the Engineer, and disposal of excess materials at a permitted disposal site.
 - 5. Dewatering and maintenance of groundwater and surface water in all excavations.
 - 6. Performance of all surveys necessary to establish and verify the lines and grades, and to determine the amount of solid rock material removed.
 - 7. Successfully coordinating all activities with a third party blast monitoring firm to monitor condition of existing structures and utilities in vicinity of proposed blasting operations to insure existing features remain undamaged by blasting procedures.
 - 8. If blasting is to be utilized for installation of the pipe at bored/tunneled roadway crossings, Contractor shall be responsible for obtaining all required permits from NCDOT, local Fire Department, and all other regulatory authorities.
 - 9. If blasting is to be utilized for installation of the pipe within Duke Energy's transmission right-of-way, Contractor shall be responsible for obtaining required permits from Duke Energy. Refer to Section 00900 (Special Provisions) and Appendix A (Duke Energy Transmission Conditional Approval Letter) for additional requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02100 – Clearing, Grubbing, and Site Preparation

B. Section 02200 – Earthwork

C. Section 02276 – Erosion and Sedimentation Control

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. North Carolina Occupational Safety and Health Standards in Construction for Blasting & Use of Explosives.

1.04 SUBSURFACE CONDITIONS

A. Reference is made to Section 01010 – Summary of Work of the Specifications for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by Engineer in preparing the Drawings and Specifications.

B. Attention is directed to the fact that there may be other water pipes, storm drains, sewer lines, electric conduits, and other utilities located in the area of the proposed excavation. Contractor shall perform all repairs to same in the event that excavation activities should disrupt service.

1.05 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01300 - Submittals, the Contractor shall submit the following at least 30 working days prior to beginning any blasting operations:

1. Names, addresses, telephone numbers, and qualifications of the blasting subcontractor(s), explosives supplier(s), including the designated Blaster-In-Charge. The firms selected shall be evaluated for approval by the Engineer/Owner.

2. Copies of Training Certificates for the designated Blaster-In-Charge, blasting foreman and any other key personnel that will be responsible for the work, showing that they have received specialized training in the proper handling of explosives.

3. A Blasting Plan, indicating the methods, materials and equipment to be used. The Blasting Plan should indicate the types of explosives to be used, drilling patterns, and a general layout and schedule for executing the work in accordance with state regulations.

4. A ground vibration and air blast monitoring plan, indicating structures that will be monitored, monitoring equipment that will be used, and personnel that will perform the monitoring.

B. At least 24 hours before each blast round, Contractor shall submit a detailed blast round design plan to the Engineer's on-site representative. The blasting plan submitted is for quality control and record keeping purposes. Review by the Engineer shall not relieve the Contractor of his responsibilities as provided herein. The blast round design submittals shall include:

1. Location (state, grid coordinates) and limits of the shot.

2. Number, diameter, and depth of blast holes to be detonated in the round, and a plan showing the drill hole pattern, spacing and distance to the free face.
 3. Depth of overburden.
 4. Total weight of explosives in the round and the types of explosives to be used.
 5. Loading diagram showing the location of explosives, primers, and initiators; and location, depth, and type of stemming to be used in each hole.
 6. Initiation sequence, including delay timer and delay system, total weight of explosive to be detonated on each delay, and a list of the timing of the delays.
 7. Manufacturer's data sheet for all explosives, primers, and initiators to be used.
 8. Planned seismic monitoring positions, distances from the blast round, and seismograph types to be used to monitor vibrations and air blast overpressures.
 9. Type and amount of blasting mats and/or depth of soil cover to be used over the top surface of the shot.
 10. Any other information required by applicable state and federal regulations.
- C. Within 24 hours after each blast round, Contractor shall submit a blasting report to the Engineer. The blasting report shall include:
1. Date and time of shot.
 2. Foreman's name.
 3. Number and depth of holes detonated.
 4. Weather conditions at the time of detonation.
 5. Type of explosives and detonators used.
 6. Peak particle velocity of ground motion and primary frequency for all ground vibration monitoring stations.
 7. Peak air blast overpressure measured.
 8. Distance from the blast round to each monitoring station for vibrations and air blast.
 9. Amount of explosive used in each hole, and maximum weight of explosive detonated on any single delay in the blast round.

1.06 USE OF EXPLOSIVES

- A. When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage or injury to persons or property resulting from the use of explosives.

- B. All explosives shall be stored in a secure manner, in compliance with all laws, and all such storage places shall be marked clearly "DANGEROUS EXPLOSIVES".
- C. The Contractor shall notify any public utility company having facilities in close proximity to the site of the work of his intention to use explosives. This notice shall be given sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury. The Contractor shall also give the Engineer, all occupants of adjacent property, and all other Contractors working in or near the Project, notice of his intention to use explosives.

PART 2 -- PRODUCTS

2.01 MATERIAL REQUIRING EXCAVATION BY BLASTING

- A. Refer to Section 02220, Paragraph 1.04.B, for the definition of rock.

2.02 INITIATORS

- A. Contractor is advised of the possible presence of high-voltage electric power lines and radio towers at the project site. Only non-electric type initiators may be used.

PART 3 -- EXECUTION

3.01 BLASTING OPERATIONS

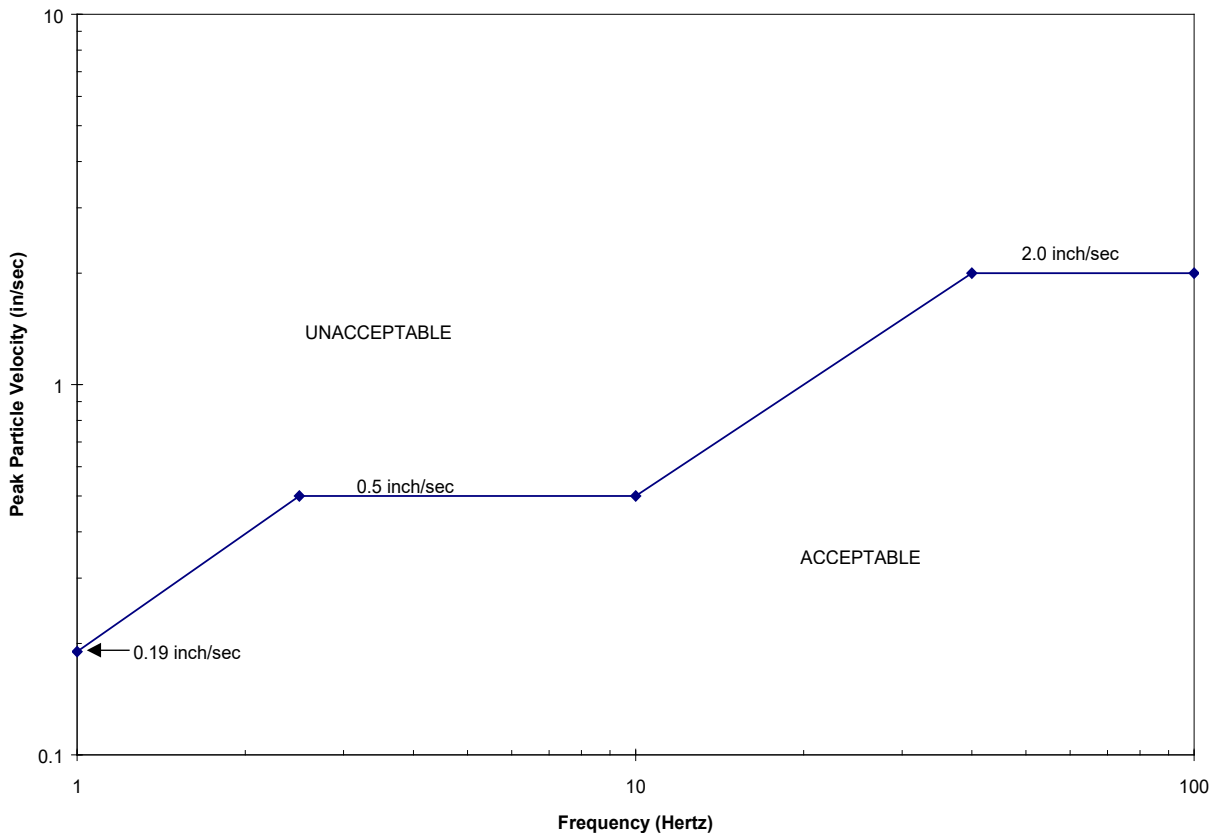
- A. Explosives shall be of such quantity and power and shall be used in such locations as will neither open seams nor otherwise disturb the material outside the prescribed limits of excavation. As the excavation approaches its final limits, the depth of holes for blasting and the amount of explosives used for each hole shall be reduced so that the underlying or adjacent rock will not be disturbed or shattered.
- B. BLASTING SHALL NOT BE PERFORMED WITHIN 100 FEET OF NEWLY PLACED CONCRETE THAT HAS CURED LESS THAN 7 DAYS. NO BLASTING SHALL BE PERMITTED WITHIN 50 FEET OF ANY EXISTING STRUCTURE OR ANY NEW STRUCTURE IN PROGRESS.

3.02 BLAST MONITORING

- A. A pre-construction condition inspection and documentation of adjacent structures on-site and off-site shall be performed by a third party firm contracted directly with the Contractor. Contractor shall notify Owner and Engineer a minimum of 30 days prior to blasting. The Contractor shall exercise the utmost care not to damage property on-site and off-site. The third party firm contracted directly with the Contractor shall notify each adjoining property owner within 1,000 feet of the site of the anticipated ground vibrations and noise which will occur due to his blasting operations. This notice shall be given 30 days in advance to enable the adjacent property owners to take whatever precautions they may consider necessary. The Contractor shall limit his operations to minimize any disturbance to the adjacent property owners. Motorists on adjacent roadways shall be notified in accordance

with state regulations. The Contractor shall be responsible for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of his operations.

- B. For each blast round, third party firm contracted directly with the Contractor shall monitor and record noise and air blast overpressures at the site perimeter nearest the blast location and at the on-site or off-site structure located nearest to the round. Peak air blast overpressure shall not exceed 0.018 psi, measured at the site perimeter.
- C. The site of every blast round shall be sufficiently covered with blasting mats or other devices to prevent any flying debris. The number and type of blasting mats must be satisfactory to the Engineer. The Contractor will be fully responsible for any damage caused by flying debris, both to on-site and off-site properties.
- D. Whenever blasting is to be performed within 500 feet of any structure, the third party firm contracted directly with the Contractor shall measure the peak particle velocities of ground vibration resulting from each blast at the structure. Vibrations shall be monitored utilizing a seismograph capable of providing a record of particle velocity and frequency along three mutually perpendicular axes utilizing internal calibration. Measured peak particle velocity of ground motion at the monitored structure shall not exceed the values shown in the following graph:



- E. The Engineer and Owner shall be notified immediately of any complaint received by the Contractor or third party blast monitoring firm. The firm shall immediately review those construction activities inducing the vibration and prepare a report documenting all relevant data such as the time and date of the complaint, a description of the construction activities, data from the monitoring instruments for the subject time/date, complaint information

(including photographs, if possible) of the alleged damage. The firm shall submit for review a detailed plan for repair and revised construction plan to address the vibration problems to minimize further damage and complaints. The Contractor shall perform necessary repairs at no additional cost to the Owner.

- F. The third party blast monitoring firm shall provide monthly reports containing the results of the crack monitors and vibration monitors during those activities that generate earthborne vibrations, including but not limited to blasting operations. The reports shall document that the firm is providing the work as described herein.
- G. Submit monitoring reports in accordance with Section 01300 – Submittals.
- H. The Owner reserves the right to require the removal of rock by other means if blasting operations result in possible hazardous conditions

- END OF SECTION -

SECTION 02207

AGGREGATE MATERIALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, equipment and materials required to complete all work associated with the installation of aggregate material beneath foundations, as backfill and as roadway subgrades and other related and incidental work as required to complete the work shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200 - Earthwork
- B. Section 02276 - Erosion and Sedimentation Control
- C. Section 02510 - Paving and Surfacing
- D. Section 02910 - Final Grading, Seeding and Landscaping

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures
 - 2. ASTM C 127 Test for Specific Gravity and Absorption of Coarse Aggregate.
 - 3. ASTM C 136 Test for Sieve Analysis of Fine and Coarse Aggregates.
 - 4. ASTM C 535 Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Materials gradation and certification.
 - 2. ASTM C127, ASTM C136, and ASTM C535 test results

PART 2 -- PRODUCTS

2.01 CRUSHED STONE, SCREENED GRAVEL and AGGREGATE BASE COURSE (ABC)

- A. Crushed stone or screened gravel shall meet the requirements of Aggregate Standard Size No. 67 as defined by NCDOT Standard Specifications.
- B. ABC shall meet the requirements of ABC as defined by NCDOT Standard Specifications.

2.02 SELECT SAND

- A. Select sand shall meet the requirements of Sections 1005 and 1014 of the NCDOT Standard Specifications for materials and gradation. The size used shall be Standard Size No. 2S or 2MS as listed and defined in Table 1005-2, "Aggregate Gradation", of the NCDOT Standard Specifications.

PART 3 -- EXECUTION

3.01 CRUSHED STONE, SCREENED GRAVEL AND AGGREGATE BASE COURSE (ABC)

- A. Contractor shall install crushed stone, screened gravel and ABC in accordance with the NCDOT Standard Specifications and as shown on the Drawings and indicated in the Contract Documents.
 - 1. Unless otherwise stated herein or shown on the Drawings, all mat foundations (bottom slabs) for the proposed structures shall have a blanket of crushed stone or ABC 6-inches thick minimum placed directly beneath the proposed mat. The blanket shall extend a minimum of 12 inches beyond the extremities of the mat.
 - 2. For subgrade preparation at structures and structural fill, the foundation material shall be ABC where specifically specified on Drawings, otherwise, crushed stone or screened gravel shall be used.
 - 3. For ground under drains, pipe bedding, and drainage layers beneath structures the coarse aggregate shall meet the requirements of aggregate standard Size No. 67, as defined by NCDOT Standard Specifications.

3.02 SELECT SAND

- A. Contractor shall install select sand in accordance with the NCDOT Standard Specifications and as shown on the Drawings and indicated in the Contract Documents.

- END OF SECTION -

SECTION 02214

EXCAVATABLE FLOWABLE FILL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, equipment, materials and services, including pumping equipment and application, necessary for the manufacture, transportation and placement of all excavatable flowable fill as shown on the Contract Drawings or specified herein.

1.02 SUBMISSIONS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Division 1, the Contractor shall submit the following:
 - 1. Shop Drawings
 - 2. Certifications of specification compliance for all sources of each material
 - 3. Manufacturer's data on all admixtures
 - 4. Mix design and trial mix test results
 - 5. Aggregate gradation

1.03 QUALITY CONTROL

- A. The Contractor shall engage the services of a testing laboratory, with the qualifications required by ASTM E329 for concrete testing, and experienced in the design and testing of flowable fill materials and mixes, to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

PART 2 -- MATERIALS

2.01 EXCAVATABLE FLOWABLE FILL

- A. Flowable fill (controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement, fly ash, admixtures and water. Flowable fill shall only be used where shown on the Drawings and shall consist of a lean concrete mix conforming to the following requirements:

Compressive strength (28-day)	40 psi min. 120 psi max.
Total Cementitious Material (lbs/c.y.)	365
Cement	65
Fly Ash	300
Fine Aggregate (NCDOT, Standard Size 2S)	2,635
SSD (lbs/c.y.)	
Water (lbs/c.y.)	500
Unit Weight – Wet (lbs/c.f.)	90 max.
Air Content	20% to 40%

Other mixes resulting in the same compressive strength range may be submitted to the Engineer for approval. Periodic testing by the Engineer for verification of strength, unit weight, slump and air content will be made.

- B. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement and reduce bleed water. Admixtures shall be Rheocell-Rheofill by Master Builders, Inc.; Darafill by Grade Construction Products; or approved equal. Cement and all other materials shall conform to ASTM C150 Type II.
- C. Fine Aggregate (Sand) shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100*	2 to 10

*For manufactured sand, the percent passing the No. 100 Sieve may be increased up to 20%.

PART 3 -- EXECUTION

3.01 PLACEMENT OF EXCAVATABLE FLOWABLE FILL

- A. Flowable fill shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment.

- B. Flowable fill shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing the air to escape shall be provided where necessary and after approval of the Engineer. Where placed against, around and inside existing structures, lift heights shall be limited so as not to overload the structure. Specific procedures and methods shall be included in the Contractor's shop drawing submittals.
- C. Where flowable fill is placed around piping and other elements subject to floating within the fill space, positive means shall be taken to provide temporary balancing loads to prevent uplift, or fill lift heights shall be limited to prevent uplift.
- D. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024 subject to the approval of the Engineer.

- END OF SECTION -

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SECTION 02220

TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Excavation, trenching, backfilling and compacting for all underground utilities, drainage piping and all related appurtenances.
- B. All land disturbing activities shall be conducted so as to absolutely minimize erosion and off site sedimentation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 2 - Sitework
- B. Division 15 – Mechanical

1.03 QUALITY ASSURANCE

A. Referenced Standards:

- 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T99, The Moisture-Density Relations of Soils using a 5.5 LB Rammer and a 12 IN Drop.
 - b. T180, Moisture-Density Relations of Soils Using a 10 LB Rammer and an 18 IN Drop.
- 2. American Society for Testing and Materials (ASTM):
 - a. C33, Concrete Aggregates.
 - b. D698, The Moisture-Density Relations of Soils Using a 5.5 LB Rammer and a 12 IN Drop. D698 is "Standard Proctor."
 - c. D1557, The Moisture-Density Relations of Soils Using a 10 LB Rammer and an 18 IN Drop. D1557 is "Modified Proctor."
 - d. D2487, Classification of Soils for Engineering Purposes.
 - e. D4253, Maximum Index Density of Soils Using a Vibratory Table.
 - f. D4254, Minimum Index Density of Soils and Calculation of Relative Density.

- B. Qualifications: Owner may hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification.

1.04 DEFINITIONS

- A. Excavation: All excavation above subgrade of trench will be unclassified except solid rock as defined below.
- B. Rock: Solid, homogeneous material which cannot be removed without the systematic drilling and blasting exceeding 1 cubic yard in volume. Material having a standard penetration resistance as determined by ASTM D1586 greater than 150 blows per foot is defined as "rock." Rock is further defined as materials and obstructions encountered that cannot be practically excavated with a large track mounted backhoe, such as a CAT-325 or larger, equipped with new rock teeth. Practical excavation is defined as the ability to remove at least 10 cubic yards during one (1) hour of continuous digging. Removal of "hard material" will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.
- C. Subgrade: Surface of the bottom of the trench after completing excavation of the trench as required by Drawings.
- D. Undercut Excavation: Unsuitable material below subgrade.

1.05 SUBMITTALS

- A. See Section 01300 - Submittals.
- B. Submit test reports and fully document each with specific location or stationing information, date, and other pertinent information.
- C. Submit respective pipe or conduit manufacturer's data regarding methods of installation and general recommendations.
- D. Submit sieve analysis reports on all granular materials.
- E. Trench Safety Plan and/or trench shoring drawings including current certification of trench shields if employed.
- F. Dewatering procedures.
- G. List of disposal sites for rock, excess materials and unsuitable materials and all required permits for use of those sites.

1.06 PROJECT CONDITIONS

- A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.

- B. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
- C. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency.
- D. Verify location of existing underground utilities.
- E. Take necessary precautions to protect existing utilities from damage due to any construction activity. Repair damages to utility items at own expense. Assess no cost to Owner, Engineer, or auxiliary party for any damages.

PART 2 – PRODUCTS

2.01 BACKFILL

- A. Select Backfill shall contain no man-made or organic materials and shall be free of rocks, clods, or other materials larger than 2-inches in nominal diameter. Materials from on-site excavations may be used for select backfill provided they meet the specified requirements. IF SUFFICIENT ON-SITE SELECT BACKFILL MATERIAL IS NOT AVAILABLE, THE CONTRACTOR SHALL SECURE ACCEPTABLE MATERIALS FROM AN OFF-SITE BORROW AREA AT NO ADDITIONAL COST TO THE OWNER, unless there is a specific payment item for offsite select backfill material. Off-site borrow material shall be approved by the Engineer before any material is transported to the work area.
- B. Common backfill materials shall be free of all organic materials and shall not contain any rocks larger than 6 inches in diameter. Materials from on-site excavations may be used for common backfill provided they meet the specified requirements. IF SUFFICIENT ON-SITE COMMON BACKFILL MATERIAL IS NOT AVAILABLE, THE CONTRACTOR SHALL SECURE ACCEPTABLE MATERIALS FROM AN OFF-SITE BORROW AREA AT NO ADDITIONAL COST TO THE OWNER, unless there is a specific payment item for offsite common backfill material. Off-site borrow material shall be approved by the Engineer before any material is transported to the work area.

2.02 BEDDING

- A. Bedding material shall be NCDOT #67 stone.

2.03 CONCRETE

- A. Concrete for encasement, cradles, caps and collars will be Class B in accordance with NCDOT requirements.

PART 3 – EXECUTION

3.01 GENERAL

- A. Perform work in conformance with applicable State and Federal safety regulations including, but not limited, to the following:
 - 1. North Carolina Safety and Health Standards for the Construction Industry (29CFR 1926 Subpart P).
 - 2. NC OSHA Industry Guide No. 14, Excavations.
 - 3. NC OSHA Industry Guide No. 20, Crane Safety.
- B. Provide barriers, warning lights, and other protective devices at excavations as necessary for safety of workers and the public.
- C. Provide traffic control in accordance with Section 02960 – Traffic Control.
- D. Provide sloping of bank, shoring, sheeting, or other means of maintaining the stability of the trench in accordance with the requirements of the Associated Contractor's Manual of Accident Prevention OSHA, Part 1926.P.
- E. In trench depths of 22 feet or greater, provide certification sealed by Structural Engineer certifying that trench box, sheeting and shoring meets OSHA requirements.

3.02 EXCAVATION

- A. Remove soil, rock, clay, silt, gravel, hard pan, loose shale, and loose stone as required for complete and satisfactory installation of utility. The unit price bid for pipe will include all excavation and trenching to subgrade, dewatering and backfilling with the exception of granular bedding material for trench stabilization.
- B. Trench Excavation:
 - 1. Excavate trenches by open cut method to depth specified and/or shown on Drawings and necessary to accommodate work.
 - 2. Open trenches:
 - a. No more than 100 LF of trench shall be open at any one time.
 - b. Field adjust limitations as weather conditions dictate.
 - c. No trenches shall be left open overnight.
 - 3. Observe following trenching criteria:
 - a. Trench size:
 - 1) Excavate width to accommodate free working space.

- 2) Maximum trench width at top of pipe may not exceed the limits shown on the Drawings.
- 3) Cut trench walls vertically from bottom of trench to 1 foot above top of pipe, conduit, or utility service.
- 4) All excavation and placement of backfill shall be carried out in the dry. See Dewatering section below.
- 5) Brace and sheet trenches in full compliance with OSHA requirements and all applicable codes and as required to protect existing roadways and utilities. See Shoring and Sheet piling section below.

C. Rock Excavation:

1. Blasting shall be permitted on this project, upon approval from all required regulatory authorities. Refer to Section 02202, Excavation by Blasting for more details.

D. Dewatering

1. The Contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. The Contractor shall control surface runoff so as to prevent entry or collection of water in excavations. The dewatering systems shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill and prevent flotation or movement of any structures, pipelines and sewers.
2. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review prior to any earthwork operations.
3. All water removed by dewatering operations shall be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.
4. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction and reconstruction, subgrade preparation, and to allow pipe or structure to be placed in a dry condition. The system shall include a sump system or other equipment, appurtenances and other related earthwork necessary for the required control of water. The Contractor shall drawdown groundwater in order to maintain a dry and undisturbed condition.
5. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the dewatering system.

6. The Contractor shall be responsible for repairing, without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area. The Contractor shall be responsible for damages to any other area or structure caused by his failure to maintain and operate the dewatering system proposed and installed by the Contractor.
7. The Contractor shall take all the steps that he considers necessary to familiarize himself with the surface and subsurface site conditions, and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering. Copies of logs of borings and laboratory test results used in design will be made available to the Contractor. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom by the Contractor.
8. Cost of dewatering is to be included in the unit price pay items for new pipe, manholes, bored/tunneled crossings, and tie-in connections.

E. Shoring and Shielding:

1. The Contractor shall comply with OSHA trenching and excavation regulations as revised in Subpart P of Part 1926 in the Federal Register. Shoring and/or shielding systems shall be used as specified in Subpart P to prevent caving of trench banks and to provide a safe excavation.
2. The Contractor will be responsible for excavation safety and shall designate his "competent person" (as defined in Subpart P) for the determination of proper shielding/shoring systems.

F. Subgrade Stabilization:

1. Stabilize unsuitable subgrade by undercutting when directed by Owner/Engineer.
2. Observe the following requirements when unstable trench bottom materials are encountered.
 - a. Notify Owner/Engineer when unstable materials are encountered.
 - b. Remove unsuitable material to the width defined on the Drawings and the depth as directed by the Engineer and dispose of the material off
 - c. Replace unsuitable material with bedding material unless otherwise directed by the Engineer.
 - d. Coordinate measurement of undercut with Engineer listing Plan station and limits.

3. Replacement of unstable subgrade material will be paid under the bid item for Undercut and will include work as outlined above.
4. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations at no additional cost to Owner.

G. Foundation for Pipe Laying:

1. Provide a continuous and uniform subgrade and bedding in the trench for all pipe in accordance with trench cross-section indicated on the Drawings.

3.03 BACKFILLING

A. Compacted Select Backfill:

1. Furnish where indicated on the Drawings, specified for trench embedment conditions and for backfill to a minimum of 12 inches above top of pipe.
2. Comply with the following:
 - a. Place backfill in lifts not exceeding 6 inches (loose thickness).
 - b. Hand place, shovel slice, and pneumatically tamp all select backfill.
 - c. Ensure all spaces beneath pipe are filled and compacted
 - d. Compact each lift to specified requirements.

B. Common Trench Backfill:

1. Perform in accordance with the following:
 - a. Place backfill in lift thicknesses capable of being compacted to densities specified below in Compaction section.
 - b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.

C. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.

D. Observe specific manufacturer's recommendations regarding backfilling and compaction.

E. Stones/rock other than crushed bedding, shall not come in contact with or be within 6 inches of pipe. Backfill that is more than 6 inches above top of pipe may contain rocks measuring not exceeding 6 inches in any dimension.

F. Water flushing or flooding for consolidation is not permitted.

3.04 COMPACTION

A. General:

1. Place and assure backfill and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
2. In no case shall degree of compaction below "Minimum Compactions" specified be accepted.

B. Compaction Requirements: Refer to Paragraph 3.09 in Section 02200.

C. Ensure backfill materials have moisture content within three (3) percent of optimum moisture content at the time of placement.

3.05 FIELD QUALITY CONTROL

A. Testing:

1. Perform in-place moisture-density tests per Section 01400 - Quality Control as directed by the Engineer.
2. Costs of "Passing" tests will be paid by Owner.
3. In the event of failing tests perform additional tests as directed until compaction meets or exceeds requirements.
4. Cost associated with "Failing" tests shall be paid by Contractor.
5. Reference to Engineer in this section will imply Soils Engineer when employed by Owner and directed by Engineer to undertake necessary inspections and/or testing.
6. Assure Owner has immediate access for testing of all soils related work.
7. Ensure excavations are safe for testing personnel.

B. Submit monitoring reports in accordance with Section 01300 – Submittals.

C. The Owner reserves the right to require the removal of rock by other means if blasting operations result in possible hazardous conditions

3.06 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS

A. The Contractor shall remove and dispose of off-site all excess and unsuitable materials at no additional cost to the Owner.

B. All excess and unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state and local laws and regulations.

- C. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.
- D. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.
- E. All excess and unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust.
- F. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner(s) of the disposal site(s).

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SECTION 02271

STONE REVETMENT (RIP RAP)

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Stone revetment (rip rap) for protection of slopes against erosion.
 - 1. Drainage outflow area.
 - 2. Slope rip rap.
 - 3. Other areas indicated.

1.02 QUALITY ASSURANCE

- A. Contractor shall furnish and install the class of rip rap as shown on drawings or as directed by the Engineer. Stone shall fully comply with the requirements of N.C. Department of Transportation Standards Specifications for Roads and Structures. The contractor may use any rock which is excavated during construction for rip rap if he performs adequate tests to provide compliance with NCDOT's requirements for class of rip rap specified and shown in the following table:

Rip Rap Size (inches)			
Class	Min	Mid-Range	Max
A	2"	4"	6"
B	5"	8"	12"
1	5"	10"	17"
2	9"	14"	23"

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section 01300.
 - 2. Certifications.
 - 3. Test reports.
 - 4. Submit all tests and certification in a single coordinated submittal. Partial submittals will not be accepted.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Stone:

1. Durable broken quarry run stone.
2. Does not disintegrate on exposure to water or weathering.
3. Free from structural fractures and defects.
4. Not containing shale, unsound sandstone, or other material which will disintegrate.
5. Provide stone graded within limits specified for Class of rip rap scheduled or shown.

PART 3 -- EXECUTION

3.01 PREPARATION

- A. Trim and dress all areas to required cross sections.
- B. Bring areas that are below allowable minus tolerance limit to grade by filling with material similar to adjacent material.
- C. Compact to density specified for backfill.
- D. Do not place any stone material on prepared base prior to inspection and approval to proceed.

3.02 PLACING

- A. Place stone revetment material on prepared foundation within limits indicated.
- B. Place on prepared base to produce a well-graded mass of stone with minimum percentage of voids.
- C. Place to required thickness and grades.
- D. Place to full thickness in a single operation to avoid displacing the underlying material.
- E. Distribute entire mass to conform to gradation specified.
 1. Do not place stone by dumping into chutes or by similar method likely to cause segregation.
- F. Keep finished stone revetment free from objectionable pockets of small stones or clusters of larger stone.

1. Hand place as necessary to obtain a well-graded distribution.
- G. Ensure a final tolerance of within 3 inches from indicated slope and grade lines.
- H. Place stone revetment in conjunction with embankment construction to prevent mixture of embankment and stone revetment materials.
- I. Maintain stone revetment until accepted.
- J. Replace any displaced material to lines and grades shown.
- K. Type II Separator Geotextile, as specified in Section 02274 (Geotextiles) shall be used under all rip rap unless otherwise noted on the Drawings.

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SECTION 02274

GEOTEXTILES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all Geotextiles, including all necessary and incidental items, as detailed or required for the Contractor to complete the installation in accordance with the Drawings and these Specifications.
- B. For the location of each type of Geotextile see the Drawings.

1.02 SUBMITTALS

- A. Prior to shipping to the site, the Contractor shall submit to the Engineer two copies of a mill certificate or affidavit signed by a legally authorized official of the Manufacturer for each type of Geotextile. The Supplier shall also submit three Geotextile samples of each product, 1 yard square each, seamed and unseamed as appropriate, with the mill certificate for each Geotextile type supplied. The mill certificate or affidavit shall attest that the Geotextile meets the chemical, physical and manufacturing requirements stated in the specifications. The samples shall be labeled with the manufacturer's lot number, machine direction, date of sampling, project number, specifications, manufacturer and product name.
- B. The Engineer shall be furnished copies of the delivery tickets or other acceptable receipts as evidence for materials received that will be incorporated into construction.

PART 2 -- MATERIALS

2.01 MATERIALS

- A. Filter Geotextile shall be a minimum 6-ounce per square yard nonwoven needle punched synthetic fabric consisting of staple or continuous filament polyester or polypropylene manufactured in a manner accepted by the Engineer and the Owner. The Geotextiles shall be inert and unaffected by long-term exposure to chemicals or liquids with a pH range from 3 to 10. The Geotextiles shall have a minimum threshold water head of 0.25-inches in the "as received" condition.
- B. Cushion Geotextile shall be a minimum 16-ounce per square yard nonwoven needle punched synthetic fabric consisting of continuous filament or staple polyester or polypropylene manufactured in a manner accepted by the Engineer and the Owner. The Geotextiles shall be inert and unaffected by long-term exposure to chemicals or liquids with a pH range from 3 to 10.

- C. Type I Separator Geotextile shall be a minimum 8-ounce per square yard nonwoven needlepunched synthetic fabric consisting of staple or continuous filament polyester or polypropylene manufactured in a manner accepted by the Engineer and the Owner. The Geotextiles shall be inert and unaffected by long term exposure to chemicals or liquids with a pH range from 3 to 10.
- D. Type II Separator Geotextile shall be a woven slit film or monofilament synthetic fabric consisting of polyester or polypropylene in a manner approved by the Engineer. Geotextile shall be treated to resist degradation due to exposure to ultraviolet light. Type II Separator Geotextile shall be Mirafi FW700 as manufactured by Mirafi, Inc., or equal.
- E. All Geotextiles shall conform to the properties listed using the test methods listed in Table 1. The Contractor shall be responsible for timely submittals of all confirmation test data for Geotextiles at the time of the Bid.

PART 3 -- EXECUTION

3.01 SHIPPING, HANDLING AND STORAGE

- A. During all periods of shipment and storage, all Geotextiles shall be protected from direct sunlight, temperature greater than 140°F. water, mud, dirt, dust, and debris.
- B. To the extent possible, the Geotextile shall be maintained wrapped in heavy-duty protective covering until use. Geotextile delivered to the project site without protective covering shall be rejected. After the protective covering has been removed, the Geotextile shall not be left uncovered for longer than three (3) days, under any circumstances.
- C. The Owner shall approve the shipping and delivery schedule prior to shipment. The Owner shall designate the on-site storage area for the Geotextiles. Unloading and storage of Geotextiles shall be the responsibility of the Contractor.
- D. Geotextiles that are damaged during shipping or storage shall be rejected and replaced at Contractor expense.

3.02 QUALITY ASSURANCE CONFORMANCE TESTING

- A. At the option of the Engineer representative samples of Geotextiles shall be obtained and tested by the Engineer to assure that the material properties conform with these Specifications. Conformance testing shall be conducted by the Engineer and paid for by the Owner.
- B. Conformance testing shall be completed at a minimum frequency of one sample per 100,000 square feet of Geotextile delivered to the project site. Sampling and testing shall be as directed by the Engineer.
- C. Conformance testing of the Geotextiles shall include but not be limited to the following properties:
 - 1. Mass Per Unit Area (ASTM D3776)
 - 2. Thickness (ASTM D5199)

3. Grab Tensile Strength (ASTM D4632)
 4. Burst Strength (ASTM D3786)
 5. Puncture Resistance (ASTM D4833)
- D. The Engineer may add to, remove or revise the test methods used for determination of conformance properties to allow for use of improved methods.
- E. All Geotextile conformance test data shall meet or exceed requirements outlined in Table 1 of these Specifications for the particular category of Geotextile prior to installation. Any materials that do not conform to these requirements shall be retested or rejected at the direction of the Engineer.
- F. Each roll of Geotextile will be visually inspected by the Engineer or his representative. The Engineer reserves the right to sample and test at any time and reject, if necessary, any material based on visual inspection or verification tests.
- G. A Geotextile that is rejected shall be removed from the project site and replaced at the Contractor's expense. Sampling and conformance testing of the Geotextile supplied as replacement for rejected material shall be performed by the Engineer at Contractor's expense.

3.03 INSTALLATION

- A. Geotextiles shall be placed to the lines and grades shown on the Drawings. At the time of installation, the Geotextile shall be rejected by the Engineer if it has defects, rips, holes, flaws, evidence of deterioration, or other damage.
- B. The Geotextiles shall be placed smooth and free of excessive wrinkles.
- C. When the Geotextiles are placed on slopes, the upslope fabric portion shall be lapped such that it is the upper or exposed Geotextile.
- D. Geotextiles shall be temporarily secured in a manner accepted by the Engineer prior to placement of overlying materials.
- E. In the absence of specific requirements shown on the Drawings, the following shall be used for overlaps of adjacent rolls of Geotextile:

GEOTEXTILE TYPE/ APPLICATION	OVERLAP OF ADJACENT ROLLS ⁽¹⁾ (INCHES)	TRANSVERSE END OVERLAP (INCHES)
Filter Geotextile	6 min	12 min
Cushion Geotextile	12 min	12 min
Separator-Roadway Applications	12 min	24 min
Separator-Slope Protection	18 min	24 min
Separator Geotextile	12 min	18 min

⁽¹⁾ Overlaps may be reduced if adjacent panels are sewn or heat bonded where approved by the Engineer.

- F. Any Geotextile that is torn or punctured shall be repaired or replaced as directed by the Engineer by the Contractor at no additional cost to the Owner. The repair shall consist of a patch of the same type of Geotextile placed over the failed areas and shall overlap the existing Geotextile a minimum of 12-inches from any point of the rupture.
- G. Any Geotextile that is subjected to excessive sediment buildup on its surface during construction shall be replaced by the Contractor prior to placement of overlying material.

TABLE 1 - MINIMUM REQUIRED GEOTEXTILE PROPERTIES*

GEOTEXTILE PROPERTY	FILTER GEOTEXTILE	CUSHION GEOTEXTILE	TYPE I SEPARATOR GEOTEXTILE	TYPE II SEPARATOR GEOTEXTILE
Geotextile Construction	Nonwoven Needlepunched	Nonwoven Needlepunched	Nonwoven Needlepunched	Woven
Mass per Unit Area (Unit Weight), ASTM D5261 (oz/yd ²)	5.6	15.7	7.8	5.6
Ultraviolet Resistance, (500 hrs.) ASTM D4355, Average % Strength Retention	70	70	70	90
Grab Tensile Strength (lbs.), ASTM D4632	130	340	200	390 ⁽¹⁾ X250 ⁽²⁾ 370X250
Grab Tensile elongation (%) ASTM D4632	50	50	50	20 MAX
Wide Width Tensile Strength, (lbs./in.) ASTM D4595	N/A	N/A	N/A	N/A
Burst Strength, ASTM D3786, Diaphragm Method (psi)	290	500	400	480
Apparent Opening Size (AOS), (mm), ASTM D4751	0.21	N/A	0.21	0.21
Permittivity at 50 mm constant head (sec ⁻¹), ASTM D4491	1.6	N/A	N/A	N/A
Puncture Resistance, ASTM D4833 (lb)	80	200	120	135

* **MINIMUM AVERAGE ROLL VALUE (MARV)**

(1) Warp Direction

(2) Fill Direction

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SECTION 02276

EROSION AND SEDIMENTATION CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

- A. The Contractor is responsible for implementing Best Management Practices (BMPs) to prevent and minimize erosion and resultant sedimentation in all cleared and grubbed areas during and after construction. This item covers the work necessary for the installation of structures and measures for the prevention of soil erosion and control of sedimentation. The Contractor shall furnish all material, labor and equipment necessary for the proper installation, maintenance, inspection, monitoring, reporting, and removal (where applicable) of erosion prevention and sediment control measures and, if applicable, to cause compliance with all local permits and the State of North Carolina Department of Environmental Quality Division of Water Quality General Permit – NCG 010000 to Discharge Stormwater under the National Pollution Discharge Elimination System for Construction Activities, for any land disturbance or construction activity of one (1) acre or more, under this Section 02276.
- B. Any land disturbance as the result of modifications to a site's drainage features or topography requires protection from erosion and sedimentation.
- C. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Contract Drawings or established by the Engineer.
- D. It is the intent of this Specification that the Contractor conducts the construction activities in such a manner that erosion of disturbed areas and off site sedimentation be absolutely minimized.
- E. All work under this Contract shall be done in conformance with and subject to the limitations of the North Carolina Rules and Regulations for Erosion and Sedimentation Control as adopted by the North Carolina Sedimentation Control Commission (15A NCAC, Chapter 4, latest edition).
- F. The following excerpts from the regulations are particularly important:
 - 1. Pursuant to North Carolina G.S. 113A-57(2), the angle of graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion-control devices or structures.
 - 2. As per North Carolina DWQ Construction General Permit NCG01, perimeter dikes, swales, ditches and slopes, disturbed areas within High Quality Water (HWQ) Zones, and slopes steeper than 3H:1V following completion of any phase of grading, shall be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion **within 7 calendar days**.

3. All other slopes of 3H : 1V or flatter, except those with slopes greater than 50 feet in length or within HWQ Zones, following completion of any phase of grading, shall be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion **within 14 calendar days**.

G. Due to the nature of the work required by this Contract, it is anticipated that the location and nature of the erosion and sediment control devices will be adjusted on several occasions to reflect the current phase of construction. The construction schedule adopted by the Contractor will impact the placement and need for specific devices required for the control of erosion. The Contractor shall develop and implement such additional techniques as may be required to minimize erosion and off-site sedimentation. The location and extent of erosion and sedimentation control devices shall be revised at each phase of construction that results in a change in either the quantity or direction of surface runoff from constructed areas. All deviations from the erosion and sedimentation control provisions shown on the Contract Drawings shall have the prior acceptance of the Engineer and shall be completed at no additional cost to the Owner.

H. Erosion and sedimentation controls applicable to this project shall be as shown on the Contract Drawings, as specified herein, as indicated by the Engineer and as detailed in the North Carolina Erosion and Sediment Control Planning and Design Manual.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 – Submittals
- B. Section 02100 – Clearing, Grubbing, and Site Preparation
- C. Section 02140 – Dewatering
- D. Section 02220 – Trenching, Backfilling and Compacting for Utilities
- E. Section 02500 – Surface Restoration
- F. Section 02910 – Final Grading, Seeding and Landscaping

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section.

- 1. 15A NCAC, Chapter 4
- 2. North Carolina Erosion and Sediment Control Planning and Design Manual, latest edition
- 3. North Carolina Department of Environment and Natural Resources General Permit NCG 010000 to Discharge Stormwater under the National Pollution Discharge Elimination System for Construction Activities, for any land disturbance or construction activity of one (1) acre or more

4. North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest edition
5. North Carolina Division of Water Quality Stormwater Best Management Practices Manual, latest edition

B. See Specification Section 01090 - Reference Standards.

1.04 REGULATORY COMPLIANCE

A. Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained from the United States, the State of North Carolina and local authorities, as necessary. Contractor is the Co-Primary Permittee and Operator under the provisions of the NPDES Permit. As such, the Contractor will be required to sign certain certifications as described in the NPDES Permit. Contractor shall comply with requirements specified in the Contract Documents, on the approved Erosion Control Plan, and by the Engineer. Contractor shall also comply with all other laws, rules, regulations, ordinances and requirements concerning soil erosion and sediment control established in the United States, the State of North Carolina and local authorities as applicable. The following documents and the documents referenced therein define the regulatory requirements for this Section 02276.

1. NPDES PERMIT: The North Carolina Department of Environmental Quality General Permit NCG 010000 to Discharge Stormwater under the National Pollution Discharge Elimination System for Construction Activities (NPDES permit) governs land disturbance or construction activities of one (1) acre or more. On applicable sites, Contractor is responsible for complying with terms and conditions of this permit.
2. Manual for Erosion and Sediment Control: Contractor shall follow Practices and Standards of the North Carolina Erosion and Sediment Control Planning and Design Manual (NC ESCPDM), latest edition.

B. During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge stormwater associated with construction activity including clearing, grading and excavation activities resulting in the disturbance of land and related support activities. Such discharges shall be controlled, limited and monitored as specified below.

1. The Contractor, as Co-Primary Permittee and Operator under the provisions of the NPDES Permit, shall submit a plan for compliance with the Owner-provided approved erosion and sedimentation control plan to the Engineer for approval. Plans must include designation of where 7 and 14-day ground stabilization requirements and where basins which comply with surface-withdrawal requirements of the NPDES permit, if applicable, are located. Land disturbing activity shall not commence until the plan is approved by the Engineer. Maintain an up-to-date copy of the approved plan on the site.
2. Implement the approved plan. Deviation from the plan is allowed only to correct emergency situations of sediment discharge offsite or when minor modifications are made to improve performance of the measures and the approval authority has been notified. Note allowed deviations on the plan maintained on the site.

3. Manage onsite activities such that no adverse impacts to water quality occur from site activities or allowed discharges. The following activities, and others on a site-specific basis, require oversight throughout the construction and development process to assure that all water quality standards are protected.
 - a. **Equipment Operation and Maintenance:** Equipment utilized during the construction activity on a site must be operated and maintained in such a manner as to prevent the potential or actual pollution of the surface or ground waters of the State. Fuels, lubricants, coolants, and hydraulic fluids, or any other petroleum products, shall not be discharged onto the ground or into surface waters. Spent fluids shall be disposed of in a manner so as not to enter the waters, surface or ground, of the State and in accordance with applicable state and federal disposal regulations. Any spilled fluids shall be cleaned up to the extent practicable and disposed of in a manner so as not to allow their entry into the waters, surface or ground, of the State.
 - b. **Material Handling:** Herbicide, pesticide, and fertilizer usage during the construction activity shall be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act and shall be in accordance with label restrictions.
 - c. **Building Material Waste Handling:** All wastes composed of building materials shall be disposed of in accordance with North Carolina General Statutes, Chapter 130A, Article 9 - Solid Waste Management, and rules governing the disposal of solid waste (North Carolina Administrative Code Section 15A NCAC 13B). In particular, the following guidelines shall be followed:
 - i. No paint or liquid wastes in streams or storm drains.
 - ii. Dedicated area for demolition, construction, and other wastes must be located a minimum of 50' from storm drains and streams unless no reasonable alternatives are available.
 - iii. Earthen-material stockpiles must be located a minimum of 50' from storm drains and streams unless no reasonable alternatives are available.
 - iv. Concrete materials onsite, including excess concrete, must be controlled to avoid contact with surface waters, wetlands, or buffers. (Note discharges from onsite concrete plants may require coverage under a separate NPDES permit – NCG140000).
 - d. **Litter and Sanitary Waste:** The Permittee shall control the management and disposal of litter and sanitary waste from the site.

C. Violations and Fines

1. Contractor shall be responsible for reimbursing the Owner for any fines incurred as a result of violations to the NC Sedimentation Pollution Control Act, the NPDES General Permit for Stormwater Discharges on Construction Sites, and any applicable delegated local program's sediment control regulations until construction activities are complete and the project is accepted by the Owner. These include fines levied by the NCDEQ Division of Land Quality, NCDEQ Division of Water Quality and delegated local programs.
2. If violations result in the issuance of a Notice of Violation, the Contractor shall comply with the requirements of the Notice within the specified time period for compliance. Failure to comply could result in the assessment of a penalty for each day of the continuing violation, beginning with the date of the violation.
3. Violations may result in civil and/or criminal penalties which include fines and imprisonment.

1.05 SUBMITTALS

- A. Prior to the start of the work, the Contractor shall prepare and submit a plan for implementing the temporary and permanent erosion and sedimentation control measures as shown on the Erosion and Sediment Control Plan approved by the appropriate regulatory authority. Construction work shall not commence until the schedule of work and the methods of operations have been reviewed and approved.
- B. The Contractor shall perform inspections of erosion and sedimentation control measures and stormwater discharge outfalls and prepare inspection reports as described in Part 3 of this Section. Copies of the inspection reports shall be submitted to the Engineer on a monthly basis.
- C. In accordance with the procedures and requirements set forth in the General Conditions Division 1 and Section 01300 - Submittals, the Contractor shall submit the following:
 1. Name and location of all material suppliers.
 2. Certificate of compliance with the standards specified above for each source of each material.
 3. List of disposal sites for waste and unsuitable materials and evidence of all required permits for use of those sites.

1.06 GUARANTEE

- A. All restoration and re-vegetation work shall be subject to the one-year guarantee period of the Contract as specified in the General Conditions.

PART 2 -- MATERIALS

2.01 MATERIALS

- A. Materials for use in erosion and sedimentation control devices shall be in accordance with the NC ESCPDM.
- B. All erosion and sediment control bid prices shall include all excavation, grading, maintenance, legal sediment disposal, permits and all other work and appurtenances necessary to design, install and maintain the sediment and erosion control measures as detailed herein and in accordance with the NC ESCPDM.

2.02 SILT FENCE

- A. Silt (or sediment) fence shall be constructed as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.62 of the NC ESCPDM. Silt fences shall be installed below small disturbed areas that are less than $\frac{1}{4}$ acre disturbed per 100-feet of fence when slopes are less than 2%. Contractor shall refer to Table 6.62a in the NC ESCPDM for criteria. Silt fence shall not be installed across streams, ditches, or waterways or other areas of concentrated flows.
- B. Silt fence shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.62 of the NC ESCPDM. Silt fence shall be a woven geotextile filter fabric made specifically for sediment control. Filter fabric shall not rot when buried and shall resist attack from soil chemicals, alkalines and acids in the pH range from 2 to 13, and shall resist damage due to prolonged ultraviolet exposure. Filter fabric shall be C-50NW as manufactured by Contech Earth Stabilization Solutions, GT 142 as manufactured by SKAPS Industries, Soiltex ST 120N as manufactured by Geo-Synthetics, Inc., or approved equal. The cost of silt fence shall include the materials, excavation, backfill, aggregate, etc. and all maintenance and restoration activities required.

- C. Silt fence shall be stable for the 10-year peak storm runoff. Fabric shall meet the following specifications:

Temporary Silt Fence Material Property Requirements					
	Test Material	Units	Supported¹ Silt Fence	Un-Supported¹ Silt Fence	Type of Value
Grab Strength	ASTM D 4632	N (lbs)			
Machine Direction			400 (90)	550 (90)	MARV
x-Machine Direction			400 (90)	450 (90)	MARV
Permittivity ²	ASTM D 4491	sec-1	0.05	0.05	MARV
Apparent Opening Size ²	ASTM D 4751	mm	0.60	0.60	Max. ARV ³
		(US Sieve #)	(30)	(30)	
Ultraviolet Stability	ASTM D 4355	% Retained Strength	70% after 500 hours exposure	70% after 500 hours exposure	Typical
¹ Silt Fence support shall consist of 14 gage steel wire with a mesh spacing of 150 mm (6 inches), or prefabricated polymer mesh of equivalent strength. ² These default values are based on empirical evidence with a variety of sediment. For environmentally sensitive areas, a review of previous experience and/or site or regionally specific geotextile tests in accordance with Test Method D 5141 should be performed by the agency to confirm suitability of these requirements. ³ As measured in accordance with Test Method D 4632.					

- D. The synthetic filter fabric shall consist of at least 95% by weight of polyolefins or polyester, certified by the manufacturer, and as specified by Section 6.62 of the NC ESCPDM.
- E. The posts for silt fences shall be 1.33 lb/linear feet steel with a minimum length of 5 feet; posts shall have projections to facilitate fastening of the fabric.
- F. For reinforcement of standard strength filter fabric use wire fence with a minimum 14 gauge and a maximum mesh spacing of 6 inches.

2.03 STONE FOR EROSION CONTROL

- A. The Contractor shall place stone for erosion control as shown on the Contract Drawings, as specified herein, as specified in Section 1610 of the NCDOT Standard Specifications, and as detailed in Section 6.15 of the NC ESCPDM. The stone for erosion control shall consist of field stone or rough un-hewn quarry stone. The stone shall be sound, tough, dense, and resistant to the action of air and water. The stone for erosion control shall be Class (A) or Class (B) as specified in the NCDOT Standard Specifications, Section 1610, unless otherwise shown on the Contract Drawings.
- B. Stone for erosion control shall be designed, installed and maintained in accordance with Part 3 of this Section, Section 1610 of the NCDOT Standard Specifications, and Section 6.15 of the NC ESCPDM. The cost for stone for erosion control shall include furnishing,

weighing, stockpiling, re-handling, placing and maintaining stone; disposal of any stone not incorporated into the project if directed by the Engineer; and any other incidentals necessary to complete the work.

2.04 RIP RAP

- A. The Contractor shall place rip rap as shown on the Contract Drawings, as specified in Section 1042 of the NCDOT Standard specifications for plain rip rap, and as detailed in Section 6.15 of the NC ESCPDM. The stone for rip rap shall consist of field stone or rough un-hewn quarry stone. The rip rap shall be sound, tough, dense, and resistant to the action of air and water. Neither the width nor thickness of individual stones shall be less than one third their length. The rip rap shall be Class 1 or 2 as specified in the NCDOT Standard Specifications, Section 1042, unless otherwise shown on the Contract Drawings.
- B. Rip rap shall be designed, installed and maintained in accordance with Part 3 of this Section, Section 1042 of the NCDOT Standard Specifications, and Section 6.15 of the NC ESCPDM. The cost for rip rap shall include furnishing, weighing, stockpiling, rehandling, placing and maintaining rip rap; disposal of any rip rap not incorporated into the project if directed by the Engineer; and any other incidentals necessary to complete the work.

2.05 ROLLED EROSION CONTROL PRODUCTS (RECPs)

- A. RECPs, including Turf Reinforcement Mat (TRM), shall be installed as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.17 of the NC ESCPDM. RECPs should be utilized to aid stabilization of slopes greater than 2:1 and with more than 10 feet of vertical relief. RECPs should also be used when mulch cannot be adequately tacked and where immediate ground cover is required to prevent erosion damage. Examples of RECPs are blankets, nets and matting.
- B. RECPs shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.17 of the NC ESCPDM. The cost for RECPs shall include all excavation, grading, and materials, and all maintenance activities.
- C. RECPs shall be used to aid in permanent stabilization of vegetated channels where runoff velocity will exceed 2 feet/second on bare earth during the 2-year rainfall event that produces peak runoff.
- D. RECPs shall be chosen based on the Design Criteria detailed in Section 6.17 of the NC ESCPDM. Typically, nets shall be used in conjunction with mulch; the use of mulch is typically not required with excelsior, woven straw blankets and coir blankets.
- E. The recommended anchoring devices are 12-inch minimum length wooden stakes, 11-gauge staples that are at least 6 inches long by 1 inch wide, or rigid, biodegradable stakes of a minimum of 6 inches in length. If Manufacturer's recommendations are more stringent, they shall supersede.
- F. The minimum bare soil shear stress values for specific RECPs are as follows:

1. Straw with net temporary RECP shall be North American Green S150, American Excelsior Co. Curlex I, Contech SFB1, or equal with a minimum bare soil shear stress value of 1.5 lb/ft².
2. Curled wood or coconut fiber RECP shall be American Excelsior Curlex II, North American Green C125, Contech EFB4 or equal matting with a minimum bare soil shear stress value of 2.0 lb/ft².
3. Synthetic Turf Reinforcement Mat (TRM) shall be Enkamat 7020 as manufactured by Colbond Geosynthetics, Synthetic Industries Landlock Erosion Mat TRM 1060, TH8 as manufactured by TC Mirafi, or equal matting with a minimum long-term vegetated shear stress value of 5.0 lb/ft².

2.06 TEMPORARY AND PERMANENT DIVERSIONS

- A. Temporary diversions shall be constructed as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.20 and 8.05 of the NC ESCPDM. Permanent diversions shall be constructed as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.21 and 8.05 of the NC ESCPDM. Temporary diversions shall be constructed adjacent to disturbed areas to collect surface runoff from disturbed areas and direct the runoff to sediment basins or to divert non-sediment laden runoff away from undisturbed areas and/or sediment basins. All temporary diversions transporting sediment-laden runoff shall terminate in a sediment trapping device. Permanent diversions should be planned as a part of initial site development and should be coordinated with temporary diversions. All temporary and permanent diversions shall be stabilized with vegetation or other means within 7 days of installation. Permanent diversions shall be used to divert water to locations where it can be used or released without erosion or flood damage. Dimensions shall be as shown on the Contract Drawings.
- B. Temporary diversions shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.20 and 8.05 of the NC ESCPDM, to the satisfaction of the Engineer, until the site has been stabilized. Permanent diversions shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.21 and 8.05 of the NC ESCPDM. The cost of temporary and permanent diversions shall include the excavation, grading, materials, etc. and all maintenance and restoration activities required.

2.07 TEMPORARY SLOPE DRAINS

- A. Temporary slope drains shall be constructed as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.32 of the NC ESCPDM. Temporary slope drains are used to convey concentrated runoff down the face of a slope without causing erosion and are generally used in conjunction with temporary diversions.
- B. The pipe diameter for temporary slope drains shall be selected according to Table 6.32a of the NC ESCPDM. The pipe shall be heavy-duty flexible material such as non-perforated, corrugated plastic pipe or specially designed flexible tubing.

- C. Temporary slope drains shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.32 of the NC ESCPDM, to the satisfaction of the Engineer, until the site has been stabilized. The cost of the temporary slope drains shall include the piping, earthwork, stone for erosion control, and all maintenance activities required.

2.08 TEMPORARY GRAVEL CONSTRUCTION ENTRANCES/EXITS

- A. Temporary gravel construction entrances/exits shall be located at points where vehicles enter and leave a construction site, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.06 of the NC ESCPDM.
- B. Temporary gravel construction entrances/exits shall be constructed with a minimum 6 inch layer of 2 – 3 inch washed stone placed over a stable foundation and shall be a minimum of 100 feet in length and 25 feet in width. Geotextile fabric shall be used under stone as shown on the Contract Drawings.
- C. Temporary gravel construction entrances/exits shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.06 of the NC ESCPDM, to the satisfaction of the Engineer, until the site has been stabilized. The cost of temporary gravel construction entrances/exits shall include the materials and all maintenance activities required, including additional tire washing as may be necessary.

2.09 TEMPORARY AND PERMANENT STABILIZATION OF DISTURBED AREAS

- A. Temporary and permanent stabilization of disturbed areas will be provided at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.10, 6.11, 6.12 and 6.14 of the NC ESCPDM. The Contractor shall provide ground cover adequate to restrain erosion on disturbed areas that will be left un-worked for periods exceeding 7 to 14 days, as noted in Section 1.01. F. of this specification.
- B. Soil amendments, including lime and fertilizer, shall be as detailed in Sections 6.10, 6.11 and 6.12 of the NC ESCPDM.
- C. Seed mixtures shall be selected based on site location and seasonal recommendations outlined in Sections 6.10 and 6.11 of the NC ESCPDM. Sod shall be selected based on site location and intended use as outlined in Section 6.12 of the NC ESCPDM.
- D. Mulch shall be as detailed in Section 6.14 of the NC ESCPDM. RECPs shall be as detailed in 2.05 herein and in Section 6.17 of the NC ESCPDM.
- E. Temporary soil stabilizer shall consist of an especially prepared highly concentrated powder which, when mixed with water, forms a thick liquid such as "Enviroseal 2001" by Enviroseal Corporation, "Terra Control" by Quattro Environmental, Inc., or "CHEM-CRETE ECO-110" by International CHEM-CRETE Corporation, and having no growth or germination inhibiting factors. The agent shall be used for hydroseeding grass seed in combination with other approved amendments resulting in a highly viscous slurry which, when sprayed directly on the soil, forms a gelatinous crust.
- F. Temporary and permanent stabilization of disturbed areas shall be achieved in accordance with Part 3 of this Section and Sections 6.10, 6.11, 6.12, 6.14 and 6.17 of

the NC ESCPDM. The cost of temporary and permanent stabilization of disturbed areas shall include all grading, excavation and materials as well as all reseeding and other maintenance activities required until stabilization is achieved.

2.10 CHECK DAMS AND CHECK DAMS WITH WEIRS

- A. Check dams shall be constructed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.83 of the NC ESCPDM. Check dams with weirs shall be constructed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.87 of the NC ESCPDM.
- B. Check dams and check dams with weirs shall not be constructed in an intermittent or perennial stream. The drainage area for any one check dam or check dam with weir shall be limited to ½ acre.
- C. Dimensions shall be as shown on the Contract Drawings. Check dams shall be constructed of stone or riprap with filter fabric, fiber filtration tubes, or sediment logs, as indicated on the Contract Drawings. Check dams with weirs shall be constructed of stone or riprap with filter fabric. Material specifications for stone, riprap, fiber filtration tubes, and sediment logs appear herein. If Manufacturer's recommendations are more stringent, they shall supersede. Filter fabric shall be Type II Separator Geotextile, as specified in Section 02274 – Geotextiles.
- D. Check dams shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.83 of the NC ESCPDM. Check dams with weirs shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.87 of the NC ESCPDM. The cost of check dams and check dams with weirs shall include all excavation, grading and materials as well as all maintenance activities required.

2.11 INLET EROSION CONTROL MEASURES

- A. Yard, Curb and other Inlet Erosion Control Measures shall be constructed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.50 through 6.55 of the NC ESCPDM. Inlet erosion control measures shall be used to prevent or limit the introduction of sediment to storm drain systems and allow early use of the of the storm drainage system. Maximum drainage areas for inlet erosion control measures vary from 1 acre for excavated drop inlet protection, hardware & cloth gravel inlet protection, and block and gravel inlet protection to more than 5 acres for rock pipe inlet protection. In addition to the inlet protection measures described in the NC ESCPDM, other measures may be specified by the Engineer. For measures not detailed in the NC ESCPDM, the materials will be as specified by the Engineer's and Manufacturer's instructions, with more stringent specifications superseding.
- B. Materials for Inlet Erosion Control Measures consist of silt fence, riprap, stone (gravel), hardware wire, sod, concrete blocks, and sediment logs. Riprap and stone for erosion control shall be as specified herein. Hardware wire shall be as specified in Section 6.51 of the NC ESCPDM. Sod shall conform to the specifications set forth in Section 6.12 of the NC ESCPDM. Concrete blocks shall be as specified in Section 6.52 of the NC

ESCPDM. Material specifications for sediment logs appear within. If Manufacturer's recommendations are more stringent, they shall supersede.

- C. Inlet Erosion Control Measures shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.50 through 6.55 of the NC ESCPDM. Measures not described in the NC ESCPDM shall be designed, installed, and maintained in accordance with the Engineer's and Manufacturer's instructions, with more stringent instructions superseding. The cost of inlet erosion control measures shall include all excavation, grading and materials as well as all maintenance activities required.

2.12 FIBER FILTRATION TUBES (FFT_s) AND SEDIMENT LOGS

- A. FFTs and sediment logs shall be installed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, and as specified herein.
- B. FFTs shall consist of composite wood fibers and man-made fibers, with or without performance-enhancing polymers, encased with cylindrical tubes composed of a heavy-duty, knitted, high density polyethylene mesh. The photodegradable mesh shall be oriented in a diamond or hexagonal pattern and shall move freely at all knitted yarn intersections.
- C. Sediment logs shall consist of natural fibers (wood, coconut, etc.) inside heavy duty knitted cylindrical tubing.
- D. FFTs and sediment logs shall be designed, installed and maintained as specified herein. If Manufacturer's recommendations are more stringent, they shall supersede. The cost of FFTs shall include all excavation, grading and materials as well as all maintenance activities required.

2.13 TEMPORARY AND PERMANENT CHANNELS

- A. Temporary and permanent channels shall be installed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.30, 6.31 and 8.05 of the NC ESCPDM. Temporary and permanent channels shall be used to convey concentrated runoff without damage from erosion, deposition or flooding.
- B. Temporary and permanent channels shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.30, 6.31 and 8.05 of the NC ESCPDM. The cost of all temporary and permanent channels shall include all excavation, grading and materials as well as all maintenance activities required.

2.14 TEMPORARY SEDIMENT TRAPS, SEDIMENT BASINS, AND SKIMMER SEDIMENT BASINS

- A. Temporary sediment traps shall be constructed as shown on the Contract Drawings, at the termination of all temporary diversions diverting sediment laden runoff, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.60 of the NC ESCPDM. These temporary measures shall not be constructed within an intermittent or perennial stream and shall be installed prior to any land disturbance activities within the drainage area. Temporary sediment traps shall be constructed by

excavating the appropriate size rectangular basin and constructing a rock-fill dam on the discharge end. Where specific elevations are not indicated on the Contract Drawings, Contractor shall maintain basins at the depths shown below working grades.

- B. Sediment basins shall be installed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.61 and 8.07 of the NC ESCPDM. Skimmer sediment basins shall be installed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.64 of the NC ESCPDM. Sediment basins and skimmer sediment basins shall be used where drainage areas are too large for temporary sediment traps. **Outlet structures must withdraw from basin surface unless drainage area is less than 1 acre.** They shall retain sediment on the site and prevent off site sediment in waterways, and they shall not be located in intermittent or perennial streams. Sediment basins and skimmer sediment basins shall be installed prior to any land disturbance activities within the drainage area.
- C. Porous baffles shall be installed in temporary sediment traps, sediment basins, and skimmer sediment basins as shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.65 of the NC ESCPDM. Porous baffles are used to reduce the velocity and turbulence of the water flowing through the structure and to facilitate the settling of sediment in the water before discharge. They effectively spread the flow across the entire width of a structure.
- D. Material used for porous baffles shall be as indicated on the Contract Drawings. Typical materials include silt fence, coir erosion blanket, coir mesh, and tree protection fence. Other materials may be used as noted on the Contract Drawings and indicated by the Engineer.
- E. The structure life for temporary sediment traps shall be limited to 2 years. Temporary sediment traps shall be spaced to limit the maximum tributary drainage area to 5 acres. The basin life of sediment basins and skimmer sediment basins shall be limited to 3 years unless they are designed as permanent structures. The drainage area for sediment basins and skimmer sediment basins shall be limited to 100 acres.
- F. The principal spillway for sediment basins shall consist of a riser and barrel. Ensure that the pipe is capable of withstanding the maximum expected load without yielding, buckling, or cracking. The basin should be provided with a skimmer or flashboard riser to dewater the basin from the water surface. The emergency spillway shall be constructed in undisturbed soil. The principal spillway outlet and emergency spillway shall be stabilized as shown on the Contract Drawings. Materials shall be as noted on the Contract Drawings.
- G. The principal spillway for skimmer sediment basins shall consist of a skimmer which dewater the basin from the top of the water surface at a controlled rate. A dewatering rate of 24 to 72 hours is required. The skimmer outlet pipe shall be capable of withstanding the maximum expected load without yielding, buckling, or cracking. The emergency spillway shall be constructed in undisturbed soil whenever possible and shall be lined with impermeable geotextile fabric in accordance with Section 02274 – Geotextiles. The principal spillway outlet and emergency spillway shall be stabilized as shown on the Contract Drawings.

- H. Temporary sediment traps shall be designed, constructed and maintained in accordance with Part 3 of this Section and Section 6.60 of the NC ESCPDM, to the satisfaction of the Engineer, until the sediment producing areas have been permanently stabilized. The cost of the temporary sediment traps shall include the excavation, grading, fill, baffles, stone for erosion control, washed stone, geotextile, etc. and all maintenance activities required.
- I. Sediment basins shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.61 and 8.07 of the NC ESCPDM. Skimmer sediment basins shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.64 of the NC ESCPDM. The cost of sediment basins and skimmer sediment basins shall include all excavation, grading and materials as well as all maintenance activities required.
- J. Porous baffles shall be designed, installed and maintained in accordance with Part 3 of this Section and Section 6.65 of the NC ESCPDM. The cost of porous baffles shall include all excavation, grading and materials as well as all maintenance activities required.

2.15 OUTLET STABILIZATION STRUCTURE

- A. Outlet stabilization structures shall be constructed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Sections 6.41 and 8.06 of the NC ESCPDM. These structures shall be used where the discharge velocity of the upstream water conveyance structure exceeds the permissible velocity of the receiving channel or disposal area.
- B. Structures shall be sized for a capacity equivalent to a 10-year, peak runoff or design discharge of the water conveyance structure, whichever is greater. Riprap materials shall be as specified on the Contract Drawings. Filter fabric shall be Type II Separator Geotextile, as specified in Section 02274 – Geotextiles.
- C. Outlet stabilization structures shall be designed, installed and maintained in accordance with Part 3 of this Section and Sections 6.41 and 8.06 of the NC ESCPDM. The cost of outlet stabilization structures shall include all excavation, grading and materials as well as all maintenance activities required.

2.16 FLEXIBLE GROWTH MEDIUM

- A. Flexible growth medium shall be applied at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, and as specified herein.
- B. Flexible growth medium is a spray-on flexible blanket that controls soil erosion and accelerates seed germination for establishment of vegetation. It is made of wood fibers, man-made fibers, and additives that are applied wet to the prepared surface. The flexible growth medium may be mixed with seed and fertilizer prior to application. Seed and fertilizer rates shall comply with applicable stabilization of disturbed area requirements of this Section.
- C. Flexible growth medium shall not be used in areas of concentrated flow unless installed in conjunction with a RECM or TRM.

- D. Flexible growth medium shall be installed and maintained in accordance with Part 3 of this Section. If Manufacturer's recommendations are more stringent, they shall supersede. The cost of flexible growth medium shall include all materials as well as all maintenance activities required.

2.17 TREE PROTECTION FENCE

- A. Tree protection fence shall be installed at the locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as detailed in Section 6.05 of the NC ESCPDM.
- B. Tree protection fence shall be used to protect trees and their root zones during construction. Tree protection fence shall be brightly-colored, UV-resistant poly barricade fabric. Signs designating the area as protected shall be installed on all sides of the fence. Wording and spacing of the signage shall be as indicated on the Contract Drawings.
- C. Tree protection fence shall be installed and maintained in accordance with Part 3 of this Section and Section 6.05 of the NC ESCPDM. The cost of tree protection fence shall include all materials as well as all maintenance activities required.

2.18 STREAM CROSSINGS

- A. Temporary and permanent stream crossings shall be installed at locations shown on the Contract Drawings, at other locations indicated by the Engineer, as specified herein, and as specified in Section 6.70 of the NC ESCPDM.
- B. Temporary and permanent stream crossings shall be used to protect the streambed and surrounding areas during construction and construction vehicle crossing. Temporary stream crossings shall be timber bridges of sufficient size and durability to meet guidelines as outlined in the NC ESCPDM and on the Contract Drawings, and shall be designed by a qualified engineer licensed in North Carolina. Permanent Stream Crossings shall be installed with the stone sizes specified on the Contract Drawings.
- C. Temporary and permanent stream crossings shall be installed and maintained in accordance with Part 3 of this Section and Section 6.70 of the NC ESCPDM. The cost of temporary and permanent stream crossings shall include all materials as well as maintenance activities required.

PART 3 -- EXECUTION

3.01 INSTALLATION AND MAINTENANCE

- A. All installation and maintenance shall be conducted in accordance with this specification and the NC ESCPDM. In the event of a discrepancy between this specification, Manufacturer's recommendations and the NC ESCPDM, the more stringent requirements shall take precedence.
- B. If applicable, all requirements of the NPDES Permit shall be followed. In the event of a discrepancy between this specification and the NPDES Permit requirements, the more stringent requirements shall take precedence.

- C. If possible, erosion and sedimentation control devices shall be established prior to clearing operations in a given area. Where such practice is not feasible, the erosion and sedimentation control device(s) shall be established concurrent with the clearing operations or immediately following completion of the clearing operations.
- D. The Contractor shall furnish the labor, materials and equipment required for routine maintenance of all erosion and sedimentation control devices. At a minimum, maintenance shall be scheduled as required for a particular device to maintain the removal efficiency and intent of the device. Note that specific maintenance intervals for various measures and practices are specified within the NC ESCPDM. Of the maintenance requirements specified herein and in the NC ESCPDM, the more stringent shall take precedence for each and every sediment and erosion control measure utilized on the site. Maintenance shall include but not be limited to 1) the removal and satisfactory, legal disposal of accumulated sediment from traps or silt barriers and 2) replacement of filter fabrics used for silt fences and stone impaired by sediment in stone filters, gravel construction entrances, etc. Maintenance as noted in items 1) and 2) above shall be performed as required, and at least once every 3 months for the duration of construction activities. Sediment removed from erosion and sedimentation control devices shall be disposed of in locations that will not result in off-site sedimentation as acceptable to the Engineer, at no additional cost to the Owner. If no suitable on site locations are available, all such sediment will be legally disposed of off site, at no additional cost to the Owner.

3.02 SILT FENCE

- A. Silt Fence shall be designed, installed and maintained in accordance with the requirements of Section 6.62 of the NC ESCPDM. Silt fence shall be erected at the locations shown on the Contract Drawings and at all other locations as may be directed by the Engineer. Silt fence shall be erected and maintained to the satisfaction of the Engineer until a vegetative ground cover has been established. Replacement of the filter fabric and its associated appurtenances, if required by the Engineer, will be at the Contractor's expense.
- B. Silt fence shall not be installed across streams, ditches, waterways or other areas of concentrated flow.
- C. Dig a trench approximately 8 inches deep and 4 inches wide and place the fabric in the bottom of the excavated ditch or use the slicing method to insert the fabric into a cut sliced in the ground with a disc. Ensure that the height of the sediment fence does not exceed 24 inches above the ground surface.
- D. Install posts 4 feet apart in critical areas and 6 feet apart on standard applications when extra strength filter fabric is used. When wire mesh support is used, posts shall be installed a maximum of 8 feet apart. Install posts 2 feet deep on the downstream side of the silt fence, as close as possible to the fabric.
- E. Joints should be avoided along the fencing. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.
- F. Compaction is vitally important for effective results. Compact the soil immediately next to the silt fence fabric with the front wheel of the tractor, skid steer or roller exerting at

least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of 4 trips.

- G. Stabilized outlets for silt fence shall be provided at locations shown on the Contract Drawings. The outlet section shall have a maximum width of 4 feet. The height of silt fence at the outlet shall be a maximum of 1 foot. A 5 foot x 5 foot (minimum) apron of #57 washed stone shall be provided on the downstream side of the silt fence outlet.
- H. Silt fence shall be erected around all catch basins which are located downstream from any construction work unless other inlet protection is specified. Should any catch basins be indicated to be relocated or modified, silt fence shall be utilized until work is completed on the catch basins. Upon completion of the modification, the area shall be rough graded, as shown on the Contract Drawings, until the end of the project, at which time final grading shall occur.
- I. Inspect silt fence at least once a week and after each rainfall event. Make any required repairs immediately.
- J. Should the fabric of any silt fence collapse, tear, decompose or become ineffective, replace it promptly. All fabric shall be replaced after the first 3 months of construction activity and every 3 months thereafter until construction activities are complete.
- K. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.
- L. Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized. Removal of any silt fence shall be permitted only with the prior approval of the Engineer or the local governing agency.

3.03 STONE FOR EROSION CONTROL

- A. Stone for erosion control shall be designed, installed, and maintained in accordance with the requirements of Section 6.15 of the ESCPDM. Stone for erosion control shall be dumped and placed in such manner that the larger rock fragments are uniformly distributed throughout the rock mass and the smaller fragments fill the voids between the larger fragments. Rearranging of individual stones by equipment or by hand shall only be required to the extent necessary to secure the results specified above, to protect structures from damage when rock material is placed against the structures, or to protect the underlying Separator Geotextile from damage during installation.
- B. Inspect at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period. Remove accumulated sediment and replace stone impaired by sediment as necessary.

3.04 RIPRAP

- A. Riprap shall be designed, installed and maintained in accordance with the requirements of Section 6.15 of the NC ESCPDM. Riprap shall be graded so that the smaller stones are uniformly distributed through the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing where necessary or ordered by the

Engineer. The placed riprap shall form a properly graded, dense, neat layer of stone. The placed riprap shall have a minimum depth of 24 inches unless otherwise specified by the Engineer. Type II Separator Geotextile, as specified in Section 02274 – Geotextiles, shall be used under all riprap unless otherwise noted.

- B. Inspect periodically for scour or dislodged stones. Control of weed and brush growth may be needed.

3.05 ROLLED EROSION CONTROL PRODUCTS

- A. RECPs shall be designed, installed and maintained in accordance with the requirements of Section 6.17 of the NC ESCPDM. The Engineer may direct the Contractor to place RECPs in permanent channels or on slopes at other locations in addition to those shown on the Contract Drawings. If Manufacturer's instructions are more stringent, they shall supersede.
- B. The Contractor shall place the RECPs where directed immediately after the channel or slope has been properly graded and, if applicable, prepared, fertilized, and seeded.
- C. Grade the surface of the installation area so that the ground is smooth and loose. When seeding prior to installation, follow the steps in Section 6.10 (Temporary Seeding) and 6.11 (Permanent Seeding) of the NC ESCPDM as applicable. Remove all large rocks, debris, etc. so as to ensure that good contact between the RECP and the ground is maintained so that no erosion occurs beneath the RECP. Terminal anchor trenches are required at RECP ends and intermittent trenches must be constructed across channels at 25-foot intervals. Terminal anchor trenches should be a minimum of 12 inches in depth and 6 inches in width, while intermittent trenches should be a minimum of 6 inches deep and 6 inches wide. Take care to maintain direct contact between the soil and the RECP.
- D. For slope installation, place RECP 2-3 feet over top of slope and into an approximately 12 inch deep by 6 inch wide excavated end trench. Using staples, stakes, or pins, anchor the RECP at 1 foot intervals along the bottom of the trench, backfill, and compact. Along the slope, pin the RECP in a 3 foot center-to-center pattern; provide a minimum 3 inch overlap for adjacent rolls.
- E. For channel installations, excavate 12 inch deep by 6 inch wide terminal trenches across the upper and lower end of the lined channel. Anchor the RECP at a minimum of 25 foot intervals utilizing either two rows of anchors or 6 inch by 6 inch cross trenches. Bury outside RECP edges in longitudinal trenches 6 inches deep and wide along the channel edges. Pin the RECP in at 1 foot intervals along the bottom of terminal trenches, backfill, and compact. Overlap adjacent rolls a minimum of 3 inches and pin at 1 foot intervals. Place the first RECP at the downstream end of the channel and unroll upstream. When starting installation of a new roll, begin in a trench or shingle-lap ends of rolls a minimum of 1 foot with upstream RECP on top to prevent uplifting.
- F. Staples, stakes, and pins shall be driven so that the top is flush with the ground.
- G. During the establishment period, check RECPs at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period. Immediately make repairs. Good contact with the ground must be maintained. Monitor and repair the RECP as necessary until ground cover is established.

3.06 TEMPORARY AND PERMANENT DIVERSIONS

- A. Temporary diversions shall be designed, installed and maintained in accordance with the requirements of Sections 6.20 and 8.05 of the NC ESCPDM. Permanent diversions shall be designed, installed, and maintained in accordance with the requirements of Sections 6.21 and 8.05 of the NC ESCPDM. The Contractor shall provide temporary and permanent diversions at all locations noted on the Contract Drawings and at all other locations as may be directed by the Engineer.
- B. Remove and properly dispose of all trees, debris, etc. Fill and compact all ditches, swales, etc. that will be crossed to natural ground level or above.
- C. Excavate, shape and stabilize diversions as shown on the Contract Drawings and described herein. Unless otherwise noted, provide vegetative stabilization immediately after installation of permanent diversions. Temporary diversions that are to serve longer than 7 working days shall be seeded and mulched as soon as they are constructed to preserve dike height and reduce maintenance. Seed and mulch disturbed areas draining into the diversions within 14 calendar days of completing any phase of grading.
- D. For temporary diversions, ensure that the top of the dike is not lower at any point than the design elevation plus the specified settlement. Provide sufficient room around temporary diversions to permit machine re-grading and cleanout. Vegetate the ridge of temporary diversions immediately after construction unless they will remain in place less than 7 working days.
- E. Provide outlet protection adequate to accept flow from diversion plus any other contributing runoff. Sediment-laden runoff shall be routed through a sediment-trapping device.
- F. Inspect temporary diversions once a week and after every rainfall event. Immediately remove sediment from the flow area and repair the diversion ridge. Carefully check outlets and make timely repairs as needed. When the area protected is permanently stabilized, remove the ridge and the channel to blend with the natural ground level and appropriately stabilize it. Inspect permanent diversions weekly and after every rainfall event during construction operations until permanent vegetation is established. After vegetation is established, inspect after major storms. Immediately remove any debris and make repairs as needed in a timely manner. Maintain healthy vegetation at all times.

3.07 TEMPORARY SLOPE DRAINS

- A. Temporary slope drains shall be designed, installed and maintained in accordance with the requirements of Section 6.32 of the NC ESCPDM. The Contractor shall provide temporary slope drains with inlet and outlet protection and associated diversion channels at all locations noted on the Contract Drawings, and at other locations as may be directed by the Engineer.
- B. Place slope drains on undisturbed soil or well compacted fill. Slightly slope the section of pipe under the dike toward its outlet. Hand-tamp the soil under and around the entrance section in lifts not to exceed 6 inches.

- C. Ensure that all slope drain connections are watertight. Ensure that all fill material is well-compacted. Securely fasten the exposed section of the drain with grommets or stakes spaced no more than 10 feet apart. Extend the drain beyond the toe of the slope and provide outlet protection.
- D. Immediately stabilize all disturbed areas following construction.
- E. Inspect the temporary slope drain, inlet and outlet protection, and supporting diversions weekly and after every rainfall event and promptly make any necessary repairs. When the protected area has been permanently stabilized, temporary measures may be removed, materials disposed of properly, and all disturbed areas stabilized appropriately.

3.08 TEMPORARY GRAVEL CONSTRUCTION ENTRANCES/EXITS

- A. Temporary gravel construction entrances/exits shall be designed, installed and maintained in accordance with the requirements of Section 6.06 of the NC ESCPDM. The Contractor shall provide temporary gravel construction entrances/exits at all locations noted on the Contract Drawings and at all other locations as may be directed by the Engineer.
- B. Maintain the gravel pad as specified in Section 6.06 of the NC ESCPDM and in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2 – 3 inch stone. Inspect each construction entrance at least weekly and after each rainfall event and replace stone impaired by sediment as necessary. Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.
- C. If, despite the use of a gravel construction entrance/exit, most of the mud and sediment are not removed from vehicle tires, tire washing may be necessary as detailed in Section 6.06 of the NC ESCPDM. If necessary this shall be done at no additional cost to the Owner.

3.09 TEMPORARY AND PERMANENT STABILIZATION OF DISTURBED AREAS

- A. The Contractor shall temporarily stabilize disturbed areas that will not be brought to final grade within 14 calendar days unless as noted in 1.01 F. of this Section. Temporary seeding shall be applied on areas that include diversions, dams, temporary sediment basins, temporary road banks and topsoil stockpiles. Areas to be stabilized with permanent vegetation must be seeded or planted within 14 working days after final grade is reached, unless temporary stabilization is applied. Temporary seeding provides protection for no more than 1 year, after which permanent stabilization should be initiated.
- B. Complete grading before preparing seedbeds, and install all necessary erosion control measures. Minimize steep slopes. If soils become compacted during grading, loosen to a depth of 6-8 inches.
- C. Reseed and mulch temporary seeding areas where seedling emergence is poor, or where erosion occurs, as soon as possible. Do not mow. Protect from traffic as much as possible.

- D. Refer to Section 6.10 of the NC ESCPDM for additional information and specifications regarding seedbed requirements, plant selection, seeding and mulching for temporary seeding applications.
- E. The operation of equipment is restricted on slopes steeper than 3:1. Provisions for vegetation establishment can be made during final grading. Vegetation chosen for these sites must not require mowing or other intensive maintenance. Good mulching practices are critical for protecting against erosion on steep slopes.
- F. Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and reseedings within the same season, if possible.
- G. Reseeding – If a stand has inadequate cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding.
- H. If vegetation fails to grow, soil must be tested to determine if acidity or nutrient imbalance is responsible.
- I. Fertilization - On the typical disturbed site, full establishment usually requires re-fertilization in the second growing season. Fine turf requires annual maintenance fertilization. Use soil tests if possible or follow the guidelines given for the specific seeding mixture.
- J. Refer to Section 6.11 of the NC ESCPDM for additional information and specifications regarding seedbed requirements, plant selection, seeding and mulching for permanent seeding applications.
- K. Refer to Section 6.12 of the NC ESCPDM for additional information and specifications regarding soil preparation, sod selection, installation, and maintenance for sodding.
- L. Inspect all seeded areas weekly and after heavy rains until permanent cover is established. Inspect within 6 weeks of planting to see if stands are adequate. Fertilize, reseed and mulch damaged and sparse areas immediately.

3.10 CHECK DAMS AND CHECK DAMS WITH WEIRS

- A. Check dams shall be designed, installed and maintained in accordance with the requirements of Section 6.83 of the NC ESCPDM. Check dams with weirs shall be designed, installed and maintained in accordance with the requirements of Section 6.87 of the NC ESCPDM. The Contractor shall provide check dams or check dams with weirs at all locations noted on the Contract Drawings and at all other locations as may be directed by the Engineer.
- B. Stone shall be placed on a filter fabric foundation. Center stone shall be at least 9 inches below natural ground level and stone shall extend 1.5 feet beyond ditch bank.
- C. For check dams with weirs, provide an apron with a length 3 times the height of the dam and a width a minimum of 4 feet. A 12-inch layer (minimum) of sediment control stone

shall be placed on the upstream side of the dam. Excavate sediment storage area to the dimensions shown on the Contract Drawings.

- D. Fiber filtration tubes and sediment logs may be specified for use as check dams. These measures shall be installed according to instructions included herein. If Manufacturer's recommendations are more stringent, they shall supersede.
- E. Spacing shall be such that the elevation of the top of the lower dam is the same as the toe elevation of the upper dam.
- F. Check dams and check dams with weirs shall be inspected at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period. Sediment, limbs and other debris shall be cleared from the channel. Repairs shall be made immediately.

3.11 INLET EROSION CONTROL MEASURES

- A. Inlet erosion control measures shall be designed, installed and maintained in accordance with the applicable requirements of Sections 6.50 through 6.55 of the NC ESCPDM. If inlet erosion control measures shown on the Contract Drawings are not included in the NC ESCPDM, Engineer's and Manufacturer's instructions for design, installation, and maintenance shall be followed, with more stringent instructions superseding. The Contractor shall provide inlet erosion control measures at all locations noted on the Contract Drawings, and at all other locations as may be directed by the Engineer.
- B. Excavated drop inlet protection shall be installed and maintained in accordance with Section 6.50 of the NC ESCPDM. Drainage area is limited to 1 acre. The minimum volume of excavated area around the drop inlet is 1800 ft³/acre disturbed. Minimum depth of the excavated area shall be 1 foot and maximum depth shall be 2 feet as measured from the crest of the inlet structure. Weep holes shall be protected by gravel. Inspect the excavated basin at least weekly and after every storm event until the contributing drainage area has been permanently stabilized. Remove sediment when the storage volume has been reduced by one-half.
- C. Block and gravel inlet protection shall be installed and maintained in accordance with Section 6.52 of the NC ESCPDM. Drainage area shall be limited to 1 acre unless site conditions allow for frequent removal of accumulated sediment. The height of the block barrier shall be no more than 12 inches and no less than 24 inches. On the bottom row, place some of the blocks on their side to allow for dewatering. Place wire mesh over all block openings to hold gravel in place. Lateral support may be provided by placement of 2 x 4 wood studs through block openings. Place gravel 2 inches below the top of the block barrier. The top elevation of the structure must be at least 6 inches below the ground elevation downslope from the inlet to ensure that all stormwater flows over the structure and enters the storm drain instead of bypassing the structure. Block and gravel inlet protection shall not be used near the edge of fill material and shall not divert water away from the storm drain. Inspect at least weekly and after every storm event until the contributing drainage area has been permanently stabilized. Remove sediment as necessary to provide adequate storage volume for subsequent rains. Replace stone as needed.

- D. Rock pipe inlet protection shall be installed and maintained in accordance with Section 6.55 of the NC ESCPDM. Rock pipe inlet protection may be used at pipes with a maximum diameter of 36 inches. It shall not be installed in intermittent or perennial streams. The minimum crest width of the riprap berm shall be 3 feet, with a minimum bottom width of 11 feet and minimum height of 2 feet. The top of the riprap shall be 1 foot lower than the shoulder of the embankment or diversions. The outside face of the riprap should be covered with a 12-inch thick layer of #5 or #57 washed stone. The sediment storage area should be excavated upstream of the rock pipe inlet protection, with a minimum depth of 18 inches below grade. The rock pipe inlet protection shall be inspected at least weekly and after any storm event of greater than ½ inch of rain per 24-hour period. Repairs shall be made immediately. Remove sediment when the volume of the sediment storage area has been decreased by one-half and replace the contaminated part of the gravel facing.

3.12 FIBER FILTRATION TUBES (FFT)s AND SEDIMENT LOGS

- A. FFTs and sediment logs shall be placed along slopes to function as slope breaks and to minimize sediment transport and in diversions/channels to serve as check dams. The Contractor shall provide FFTs and sediment logs at all locations noted on the Contract Drawings, and at all other locations as may be directed by the Engineer.
- B. FFTs and sediment logs shall be installed to maintain contact with the soil surface. Install prior to seeding. May be installed before or after installation of RECPs.
- C. Anchor the upstream/upslope side of the FFTs using wire staples or approved devices at 1-foot intervals. Drive wooden stakes through downstream/downslope side of the FFTs at 2-foot intervals. Take care not to compress the FFTs. Backfill and compact loose soil against the upstream/upslope side. Overlap adjacent FFT ends by a minimum of 1 foot.
- D. For channel installation, construct anchor trench 3 inches deep by FFT diameter and place loose soil against upstream side of FFT. For channel gradients of 2%, install trenches on 25-foot intervals. Decrease interval distance with steeper channel gradients or more highly erosive soils.
- E. Any sediment accumulation at the base of the FFT must be removed when it reaches one-third of the height of the tube. FFT may need to be removed if fully loaded with captured sediment for maximum product performance. FFTs are to be left in place or removed from the site as directed by the Engineer.
- F. Sediment logs do not require installation trenches. Wood stakes shall be placed at least every 2 feet along the length of the sediment log. Stakes shall only penetrate the netting around the log. They shall not be driven through the center of the log. Sediment logs are to be left in place or removed from the site as directed by the Engineer.
- G. The FFTs and sediment logs shall be inspected at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period. Look for signs of flow undercutting the logs. Re-anchor and replace as necessary.

3.13 TEMPORARY AND PERMANENT CHANNELS

- A. Temporary and permanent channels shall be designed, installed and maintained in accordance with the requirements of Sections 6.30, 6.31 and 8.05 of the NC ESCPDM.

The Contractor shall provide temporary and/or permanent channels at all locations noted on the Contract Drawings, and at all other locations as may be directed by the Engineer.

- B. Remove all trees, brush, stumps, etc. from the channel area and dispose of properly.
 - C. Excavate the channel to the dimensions shown on the plans, over-excavating to allow for liner thickness. Remove and properly dispose of all excess soil so that surface water may enter the channel freely.
 - D. Armor the channel as specified on the Contract Drawings. If the specified channel lining requires an establishment period, protect the channel with mulch or a temporary liner sufficient to withstand anticipated velocities during this period.
 - E. During the establishment period, inspect channels weekly and after every rainfall. After lining has been fully established, inspect channels after any storm event of greater than ½ inch of rain per 24-hour period. Immediately make repairs.
 - F. Perform all channel construction to keep erosion and water pollution to a minimum. Immediately upon completion of the channel, vegetate all disturbed areas or otherwise protect them against soil erosion. Where channel construction will take longer than 7 days, stabilize channels by reaches.
 - G. Inspect the channel outlet and all road crossings for bank stability and evidence of piping or scour holes. Give special attention to outlets and points where concentrated flow enters the channel.
 - H. Maintain all vegetation adjacent to and in the channel in a healthy, vigorous condition to protect the area from erosion.
 - I. Remove all significant sediment accumulations to maintain the designed carrying capacity.
- 3.14 TEMPORARY SEDIMENT TRAPS, SEDIMENT BASINS, AND SKIMMER SEDIMENT BASINS
- A. Temporary sediment traps shall be designed, installed and maintained in accordance with the requirements of Section 6.60 of the NC ESCPDM. Sediment basins shall be designed, installed and maintained in accordance with the requirements of Section 6.61 of the NC ESCPDM. Skimmer sediment basins shall be designed, installed and maintained in accordance with the requirements of Section 6.64 of the NC ESCPDM. The Contractor shall provide these structures at all locations shown on the Contract Drawings and at all other locations as may be directed by the Engineer.
 - B. Care shall be taken to ensure that proper site preparation operations are conducted prior to trap or basin construction. Clear, grub and strip embankment location.
 - C. A cut-off trench shall be excavated along the center line of the earth fill embankment for sediment basins and skimmer sediment basins. Keep the trench dry during backfilling and compaction operations.
 - D. Fill material shall be free of roots, woody vegetation, rocks, and other objectionable materials. Fill shall be placed in 6 to 8 inch layers and compacted. Construct the

embankment to an elevation 10 percent (minimum of 6 inches) higher than the design height to allow for settling.

- E. Inlets to the sediment traps and basins shall be constructed so as to prevent erosion. Use diversions to divert sediment-laden water to the upper end of the basin.
- F. Shape the sediment trap or basin to the specified dimensions.
- G. Following construction of the embankment, clear the sediment trap or basin area below the crest elevation of the spillway to facilitate sediment cleanout. Provide access for cleanout of accumulated sediment.
- H. Spillway/outlet configuration shall be constructed as specified below.
- I. Temporary sediment trap
 - 1. Construct riprap outlet in embankment. Use filter fabric or a keyway cutoff trench between the riprap and the soil to protect it from piping. The outlet weir must be level and constructed to grade to assure design capacity. Ensure that the stone spillway outlet extends downstream past the toe of the embankment until the outlet velocity is acceptable for the receiving stream.
 - 2. Provide emergency bypass in natural, stable areas, located so that flow will not damage the embankment.
- J. Sediment basin
 - 1. Securely attach the riser to the barrel or barrel stub to make a watertight structural connection. Secure all barrel connections with approved watertight assemblies. Install anti-seep collar(s) as noted on the Contract Drawings. Ensure that the pipe stays in firm contact with its foundation when compacting fill around the pipe. Do not use pervious material as backfill around the pipe. Anchor the riser to prevent floatation. Install trash guard to prevent the riser and barrel from becoming clogged.
 - 2. Install basin dewatering mechanism as noted on the Contract Drawings.
 - 3. Install outlet protection as specified at principal spillway outlet. Install the emergency spillway in undisturbed soil and provide stabilization as specified.
- K. Skimmer sediment basin
 - 1. Excavate a shallow pit under the skimmer or provide a low support of stone or timber under the skimmer to prevent the skimming device from settling into the mud.
 - 2. Place the barrel on a firm, smooth foundation of impervious soil. Do not use pervious material to backfill around the pipe. Ensure that the barrel stays in firm contact with its foundation when compacting fill around the pipe.
 - 3. Assemble the skimmer following the Manufacturer's instructions, or as designed.

4. Lay the assembled skimmer on the bottom of the basin with the flexible joint at the inlet of the barrel pipe. Attach the flexible joint to the barrel pipe and position the skimmer over the excavated pit or support. Attach a rope to the skimmer and anchor it to the side of the basin so that the skimmer may be pulled to the side for maintenance.
 5. Install the spillway in undisturbed soil to the greatest extent possible and line with laminated plastic or impermeable geotextile fabric. Anchor the edges of the fabric in a trench with staples or pins. Install outlet protection as specified at the principal spillway outlet.
- L. Install porous baffles in temporary sediment traps, sediment basins, and skimmer sediment basins as shown on the Contract Drawings and as specified herein. Porous baffles shall be designed, installed and maintained in accordance with the requirements of Section 6.65 of the NC ESCPDM. The Contractor shall provide porous baffles at all locations noted on the Contract Drawings, and at all other locations as may be directed by the Engineer.
1. Care shall be taken when installing porous baffles so they perform as designed. Baffle material shall be secured at the bottom and sides of sediment trap or basin. Fabric shall not be spliced but a continuous piece shall be used across the trap or basin.
 2. Install at least three rows of baffles between the inlet and outlet discharge point. Sediment traps and basins less than 20 feet in length may use 2 baffles.
 3. Posts or saw horses shall be installed across the width of the sediment trap or basin unless an alternate baffle configuration is shown on the Contract Drawings. Steel posts shall be driven to a depth of 24 inches, spaced a maximum of 4 feet apart. Baffle weirs shall be installed at locations and according to details on the Contract Drawings. Except in locations of baffle weirs, the top of the fabric shall be 6 inches higher than the invert of the spillway and 2 inches lower than the top of the berms.
- M. Sediment traps and basins shall be constructed so that the area disturbed and resulting erosion is minimized. The emergency spillway, embankment, and all other disturbed areas above the crest of the principal spillway are to be stabilized immediately after construction.
- N. Sediment traps and basins may attract children and should be considered dangerous. Steep side slopes should be avoided and fences with warning signs may be necessary if trespassing is likely.
- O. Inspect temporary sediment traps, sediment basins, and skimmer sediment basins once a week and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period. Repairs shall be made immediately.
1. Sediment, limbs and other debris shall be cleared and the trap or basin shall be restored to its original dimensions when it accumulates to one-half the design depth or more frequently as directed by the Engineer. Sediment material removed from traps and basins shall be disposed of by the Contractor in locations that will not result in off-site sedimentation as acceptable to the

Engineer, at no additional cost to the Owner. If no suitable on site locations are available, all such sediment will be legally disposed of off site, at no additional cost to the Owner.

2. The embankment, spillways and outlet shall be checked for erosion damage and the embankment shall be checked for piping and settlement. Immediately fill any settlement of the embankment to slightly above design grade. Any riprap displaced from the spillway must be replaced immediately. Replace contaminated gravel facing of riprap outlets as necessary. Inspect vegetation. Reseed and re-mulch as necessary.
3. Baffles, fabric and skimmer shall be inspected for damage. Repairs shall be made immediately. Re-anchor baffles if water is flowing under or around them.
4. Debris shall be removed from the skimmer to prevent clogging. Special precautions shall be taken in winter to prevent the skimmer from plugging with ice.

3.15 OUTLET STABILIZATION STRUCTURE

- A. Outlet stabilization structures shall be designed, installed and maintained in accordance with the requirements of Sections 6.41 and 8.06 of the NC ESCPDM.
- B. The Contractor shall ensure the subgrade, riprap and gravel filter conforms to the grading limits shown on the plans.
- C. Riprap shall be installed in accordance with the specifications contained herein, with filter fabric placed under the riprap.
- D. The apron shall be constructed on zero grade with no overfill. Ensure the apron is properly aligned with the receiving stream.
- E. All disturbed areas shall be stabilized with vegetation immediately after construction.
- F. Outlet stabilization structures shall be inspected at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period to see if any erosion around or below the riprap has taken place or if stones have been dislodged. Repairs shall be made immediately.

3.16 FLEXIBLE GROWTH MEDIUM

- A. Flexible growth medium shall be applied and maintained in accordance with the requirements detailed herein. If Manufacturer's recommendations are more stringent, they shall supersede.
- B. Grade area according to the Contract Drawings and prepare seedbed in accordance with this Section and Section 2910 – Final Grading and Landscaping.
- C. Apply flexible growth medium at rate noted on the Contract Drawings. Application may be made either in conjunction with application of seed and fertilizer or following application of seed and fertilizer. Slope interruption devices are recommended when slope lengths exceed 100 feet. Traffic shall be kept off treated areas.

- D. Areas treated with flexible growth medium shall be inspected at least weekly and within 24 hours after any storm event of greater than ½ inch of rain per 24-hour period until vegetation is established. Reapply in areas where seedling emergence is poor.

3.17 TREE PROTECTION FENCE

- A. Tree protection fence shall be installed and maintained in accordance with the requirements of Section 6.05 of the NC ESCPDM. If Manufacturer's recommendations are more stringent, they shall supersede.
- B. Install tree protection fence around all designated tree protection areas prior to clearing, deliveries, and other construction activities onsite. Post signs designating area as protected on all sides of the fencing.
- C. Inspect tree protection fence weekly. Repair and replace as needed.

3.18 STREAM CROSSINGS

- A. Temporary and permanent stream crossings shall be installed and maintained in accordance with the requirements of Section 6.70 of the NC ESCPDM. If timber bridge manufacturer's recommendations are more stringent, they shall supersede.
- B. Keep clearing and excavation of the stream banks and bed approach to a minimum while placing stream crossings. Stream crossings shall be installed at a right angle to the stream flow in all locations.
- C. Temporary stream crossings shall be removed immediately when they are no longer needed, and stream channel and banks shall be restored to its original cross section, and in previous or better condition.
- D. Inspect temporary and permanent stream crossings either weekly or after runoff-producing rain events, whichever occurs more often, to check for blockage of stream, erosion of stream banks, scour of diversions and stream, astone displacement. Repair and replace as needed.

3.19 ADDITIONAL REQUIREMENTS

- A. All storm sewer piping shall be blocked at the end of every working day until the inlet is constructed above grade.
- B. All streets around the construction area shall be scraped as necessary to prevent accumulation of dirt and debris.
- C. The Contractor shall provide adequate means to prevent any sediment from entering any storm drains, curb inlets (curb inlet filter box), ditches, streams, or bodies of water downstream of any area disturbed by construction. Excavation materials shall be placed upstream of any trench or other excavation to prevent sedimentation of offsite areas. Silt fence will be provided, at no additional cost to the Owner, around excavation materials if deemed necessary by the Engineer. In areas where a natural buffer area

exists between the work area and the closest stream or water course, this area shall not be disturbed.

- D. The Engineer may direct the Contractor to place any additional sediment and erosion control devices at other locations not shown on the Drawings.

3.20 INSPECTIONS AND MAINTENANCE

- A. The Contractor shall designate an Authorized Representative to perform inspections and maintenance as described herein. Contractor shall perform regular inspections and maintain records as follows:

1. Inspections shall be performed, at a minimum, once every seven calendar days and within 24 hours after any storm event of greater than ½ inch of rain per 24 hour period.
2. A rain gauge shall be maintained in good working order on the site and all rainfall amounts recorded throughout the duration of construction activities.
3. Inspection reports must be available on-site during business hours unless a site-specific exemption is approved.
4. Inspection records must be kept for 3 years following completion of construction and be available upon request.
5. Electronically-available records may be substituted under certain conditions as approved by Land Quality and DWQ.

- B. During inspections the following will be observed and appropriate maintenance activities shall be performed:

1. The conformance to specifications and current condition of all erosion and sediment control structures.
2. The effectiveness and operational success of all erosion and sediment control measures.
3. The presence of sediments or other pollutants in storm water runoff at all runoff discharge points.
4. The presence of sediments or other pollutants in receiving waters.
5. Evidence of off-site tracking at all locations where vehicles enter or exit the site.
6. Evidence of impacts to water quality due to site activities pertaining to equipment operation and maintenance, material handling, and material storage and construction laydown areas exposed to precipitation.

- C. Immediate action shall be taken to repair/maintain erosion and sediment control measures that are not performing as designed. The State reserves the right to stop all construction activities not related to these measures until such deficiencies are repaired.

- D. In areas that have undergone final stabilization, inspections and, if necessary, maintenance by Contractor will occur at least once per month for the duration of the contract or project, whichever is longer.

3.21 MONITORING AND REPORTING

- A. Monitoring: The Contractor shall be responsible for the implementation of the Inspections and Maintenance Procedures as included in the approved erosion and sediment control plan. Contractor shall be certified by Mecklenburg County Stormwater Services. The Charlotte-Mecklenburg Certified Site Inspector (CMCSI) Seminar is normally offered three times per year at a cost of \$25 per participant (non-refundable). To become certified, participant must attend the CMCSI Seminar and pass the test. The implementation must comply with guidelines as set forth in the NPDES General Permit NCG 010000 (Part I Section B: Minimum Monitoring and Reporting Requirements), as well as those of any local regulatory authorities. Minimum monitoring requirements are as follows:

1. A rain gauge shall be maintained in good working order on the site.
2. A written record of the daily rainfall amounts shall be retained. (Note: if no rainfall occurred the Contractor must record "zero").
3. The control measures shall be inspected to ensure that they are operating correctly. Inspection records must be maintained for each inspection event and for each measure. All erosion and sedimentation control measures must be inspected by the Contractor at least once every seven calendar days and within 24 hours after any storm event of greater than ½ inch of rain per 24 hour period unless otherwise noted herein. Some measures require inspection following each rainfall event.
4. Once land disturbance has begun on the site, stormwater runoff discharge outfalls shall be inspected by observation for erosion, sedimentation and other stormwater discharge characteristics such as clarity, floating solids, and oil sheens. Inspections of the outfalls shall be made at least once every seven calendar days and within 24 hours after any storm event of greater than ½ inch of rain per 24 hour period. Inspection records must be maintained for each inspection event and for each discharge location.
5. If any visible sedimentation is leaving the site or entering waters of the State, corrective action shall be taken immediately to control the discharge of sediments. **Where visible deposition of sediment has occurred in surface waters or wetlands, the Contractor must verbally contact the Engineer and the Division of Water Quality within 24 hours of becoming aware of the deposition. Written notification shall be made to the Engineer and the Division of Water Quality within 5 days of becoming aware of the deposition.**

- B. Reporting: The Contractor must keep a record of inspections onsite with a copy of the approved erosion and sediment control plan. Inspection records shall be made available to DWQ or its authorized agent upon request. Copies of inspection records shall be sent to the Engineer on a monthly basis. The records must provide the details of each inspection including observations and corrective actions taken as described below. The

required rainfall and monitoring observations shall be recorded on an "Inspection Record for Activities Under Stormwater General Permit NCG010000" form provided by DWQ or a similar inspection form that is inclusive of all of the elements contained in the Division's form. A sample inspection form can be found at the end of this Section.

1. Control Measure Inspections: Inspection records must include at a minimum: 1) identification of the measures inspected, 2) date and time of the inspection, 3) name of the person performing the inspection, 4) indication of whether the measures were operating properly, 5) description of maintenance needs for the measure, 6) corrective actions taken and 7) date of actions taken.
 2. Stormwater Discharge Inspections: Inspection records must include at a minimum: 1) identification of the discharge outfall inspected, 2) date and time of the inspection, 3) name of the person performing the inspection, 4) evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5) indication of visible sediment leaving the site, 6) actions taken to correct/prevent sedimentation and 7) date of actions taken.
 3. Visible Sedimentation Found Outside the Site Limits: Inspection records must include 1) an explanation as to the actions taken to control future releases, 2) actions taken to clean up or stabilize the sediment that has left the site limits and 3) the date of actions taken.
 4. Visible Sedimentation Found in Streams or Wetlands: All inspections should include evaluation of streams or wetlands onsite or offsite (where accessible) to determine if visible sedimentation has occurred.
 5. Visible Stream Turbidity – If the discharge from a site results in visible stream turbidity, inspection records must record that evidence and actions taken to reduce sediment contributions.
- C. The State reserves the right to use its own resources to duplicate monitoring and verify the work required by the Contractor in this section.
1. The Sedimentation Pollution Control Act requires persons responsible for land-disturbing activities to inspect a project after each phase of the project to make sure that the approved erosion and sedimentation control plan is being followed.
 2. The self-inspection program is separate from the weekly self-monitoring program of the NPDES Stormwater Permit for Construction Activities. The focus of the self-inspection report is the installation and maintenance of erosion and sedimentation control measures according to the approved plan. The inspections should be conducted after each phase of the project, and continued until permanent ground cover is established.
 3. The Self-Inspection Report form may be found at the end of this section and is also available as an Excel spreadsheet from the Land Quality web site, http://www.dlr.enr.state.nc.us/pages/sedimentation_new.html
- D. Sites discharging to streams named on the state's 303(d) list as impaired for sediment-related causes may be required to perform additional monitoring, inspections or application of more stringent management practices if it is determined that the additional

requirements are needed to assure compliance with the federal or state impaired-waters conditions. Inspection records must be maintained for each inspection event and for each discharge location. If a discharge covered by this permit enters a stream segment that is listed on the Impaired Stream List for sediment-related causes, and a Total Maximum Daily Load (TMDL) has been prepared for those pollutants, the Permittee must implement measures to ensure that the discharge of pollutants from the site is consistent with the assumptions and meets the requirements of the approved TMDL. The DWQ 303(d) list can be found at: http://h2o.enr.state.nc.us/tmdl/General_303d.htm/.

3.22 REMOVAL OF TEMPORARY SEDIMENT CONTROL STRUCTURES

- A. At such time that temporary erosion and sediment control structures are no longer required under this item, the Contractor shall notify the Engineer of its intent and schedule for the removal of the temporary structures. The Contractor shall obtain the Engineer's approval in writing prior to removal. Once the Contractor has received such written approval from the Engineer, the Contractor shall remove, as approved, the temporary structures and all sediments accumulated at the removed structure shall be returned upgrade and stabilized so they do not re-erode. In areas where temporary control structures are removed, the site shall be left in a condition that will restore original drainage. Such areas shall be evenly graded and seeded as specified in Section 02910 - Final Grading and Landscaping.

-- END OF SECTION --

(The Inspection Record for Activities under Stormwater General Permit NCG01000 and the Land Quality Self-Inspection Report Form follows this Section.)

INSPECTION RECORD
FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCG010000

PROJECT: _____ MONITORING FOR THE WEEK BEGINNING: _____

All erosion and sedimentation control measures and stormwater discharge outfalls must be inspected at least once per seven calendar days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24 hour period. Permittee must keep a record of inspections onsite and send copies of inspection reports to the Engineer monthly. Inspection records must be maintained for each inspection event and for each discharge location.

RAINFALL: Gauge must be maintained on site. Record amount daily.

Day/Date	Rainfall Amount (inches)	Name Of Inspector

By this signature, I certify (in accordance with Part II Section B (10) of the NCG010000 permit) that this report is accurate and complete to the best of my knowledge: _____ (Signature of Permittee or Designee) Date	
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CONTROL MEASURE INSPECTION: May require additional pages.

Measure Identification (i.e., silt fence, sediment pond, sediment trap, ground cover)	Date and time of inspection	Name of inspector	Operating properly? (Y/N)	Describe maintenance needs/corrective actions taken (may need to attach additional information)	Date corrective action taken

STORMWATER DISCHARGE OUTFALL INSPECTION: May require additional pages.

Stormwater Discharge Outfall Identification	Date and time of inspection	Name of inspector	Evidence of other pollutants discharging from the site (i.e., oil sheen, discoloration, cement wastes, sanitary waste, fertilizers, or fuel or material storage leakage)	Erosion seen near outfall? (Y/N)	Describe actions taken to correct/prevent sedimentation	Date corrective action taken

VISIBLE SEDIMENTATION AND/OR STREAM TURBIDITY: Any visible sedimentation observed during inspections must be recorded, corrected, and cleaned up. Take immediate corrective action to control the discharge of sediments outside the disturbed limits of the site.

Visible sedimentation found outside site limits? (Y/N) If Yes, was DWQ contacted?	Describe actions taken to control future releases and actions taken to clean up or stabilize the sediment that has left the site	Date corrective action taken	Visible sedimentation found in streams, wetlands, or buffers? (Y/N)	Describe actions taken to control future releases and actions taken to clean up or stabilize the sediment that has left the site	Date corrective action taken	Visible decrease in stream clarity (increased turbidity/cloudiness)? (Y/N)	Describe actions taken to reduce sediment contributions	Date corrective action taken

Has all land disturbing activity been completed? _____ (Y/N) Has the final permanent ground cover been completed & established? _____ (Y/N)

SELF-INSPECTION REPORT FOR LAND DISTURBING ACTIVITY AS REQUIRED BY NCGS 113A-54.1

PROJECT NAME:		PROJECT NO.:	
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NAME OF INSPECTOR:		AFFILIATION*:	
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(*Landowner, Financially Responsible Party or Agent)

ADDRESS OF INSPECTOR:			
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TELEPHONE NUMBER:			
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Signature:		Date:	
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(Landowner, Financially Responsible Party or Agent)

Phase of Approved Erosion and Sedimentation Control Plan:

Mark (X)

Installation of perimeter erosion and sediment control measures	
Clearing and grubbing of existing ground cover	
Completion of any phase of grading of slopes or fills	
Installation of storm drainage facilities	
Completion of construction or development	
Establishment of permanent ground cover sufficient to restrain erosion	

EROSION AND SEDIMENTATION CONTROL MEASURES INSPECTED:

Name/Number/ Location of Measure (List all measures on Plan)	Measures Installed Since Last Report		Measure Operating Properly (Yes/No)	Significant Deviation from Plan? (Yes/No)	Describe Corrective Actions Needed *
	Proposed Dimensions (feet)	Actual Dimensions (feet)			

SECTION 02340

BORED/TUNNELED CROSSING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The work covered by this Section consists of the construction of casing and carrier pipe across State highway (NCDOT) and City/County roadway rights-of-way and/or streams/creeks as detailed on the Drawings and described in these Specifications. Casing pipe shall be of steel construction and shall be bored/tunneled and jacked into its location by conventional bore/tunnel and jack methods. Casing pipe shall be welded at joints and be straight across alignment indicated on the Drawings.
- B. The Contractor shall furnish all labor, material, equipment, and incidental items necessary to excavate the jacking and receiving pits and complete the work as shown on the Drawings and as specified herein.
- C. The Contractor shall perform any general excavation required prior to placing the casing pipe. Material resulting from any excavation shall be disposed of by the Contractor in a suitable manner.
- D. The Contractor shall provide all necessary access including access ladders, ramps, etc. to jacking and receiving pits prior to the commencement of the jacking and boring/tunneling operations.
- E. The Contractor shall furnish the names of all subcontractors which he proposes to use for this work including necessary evidence and/or experience records. The Contractor or subcontractor performing the jacking and boring/tunneling construction shall have a minimum of seven (7) years experience in jacking and boring/tunneling casing pipe on similar projects of similar pipe diameters.
- F. The highway crossings shall comply with standards set forth in the "Policies and Procedures for Accommodating Utilities on Highway Rights of Way" from the N.C. Department of Transportation, Division of Highways (Latest Revision), and the "Standard Specifications for Highway Bridges" from AASHTO (Latest Revision).
- G. The materials covered by these Specifications are intended to be standard materials of proven reliability and as manufactured by reputable manufacturers having experience in the production of such materials. The materials furnished shall be designed, constructed, and installed in accordance with the best practices and methods.
- H. The bore/tunnel installation shall be "Guaranteed". The term "Guaranteed" indicates an absolute commitment by the Contractor to install the indicated casing and carrier piping per the specified lines and grades and in accordance with the Contract Documents. The Contractor assumes all risk for the accurate and successful casing installation. Payment will only be made for accurate casing installations. The Contractor will not receive payment for any direct or indirect costs related to failed attempts, abandoned installations or any other

incorrect casing installation. The Contractor will remove or appropriately abandon incorrect casings as directed at no additional cost to the Owner.

- I. Contractor shall adhere to all the NCDOT Special Provisions stipulated in the Encroachment Contract, including securing the services of a professional engineer registered in the State of North Carolina to certify the work and to serve as the Engineer in Responsible Charge of Construction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 2 – Sitework

1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Requirements and Division 1, the Contractor shall submit the following:
 1. Casing pipe shop drawings and material data from casing pipe manufacturer.
 2. Jacking and receiving pit excavation details including footprint drawing of jacking and receiving pit, design and calculations for any sheeting or shoring utilized signed and sealed by a professional engineer registered in the State of North Carolina.
 3. Construction sequence plan including drilling, casing, and grouting placement procedures.
 4. Casing Spacer manufacturer's data and shop drawings.
 5. Experience qualifications of contractor or subcontractor.

1.04 QUALITY Assurance

- A. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All aluminum welding shall be performed by welders certified in accordance with AWS D1.2. All stainless steel welding shall be performed by welders certified in accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.

PART 2 -- MATERIALS

2.01 STEEL CASING PIPE

- A. Steel casing pipe interior diameter shall be as indicated on the Drawings or shall, in all cases, be great enough to afford easy removal of the carrier pipe without disturbing the casing pipe or roadbed. The casing pipe shall be smooth wall or spiral welded steel pipe. Casing pipe shall be leak-proof construction and be capable of withstanding highway or railroad loadings where applicable.
- B. Casing pipe shall be steel pipe in sizes 12-inches and larger manufactured from steel having a minimum yield stress strength of 35,000 psi and shall have a minimum wall thickness as indicated on the Contract Drawings. The minimum pipe size and wall thickness shall be as indicated on the Contract Drawings.

- C. All joints shall be butt welded with a full depth, 45° double bevel groove weld with a ¼" ± gap at the weld root and performed by a certified welder. A weld backing plate may be utilized at the Contractor's discretion.
- D. All joints in casings in railroad right-of-ways shall be radiographically tested in accordance with AWS by an independent testing agency at the Contractor's expense and shall submit all test reports to the Engineer. All joints in casings at all other locations shall be visually inspected for general quality and for verification that full depth weld penetration was achieved at the weld root. Inadequate welds shall be corrected or redone and retested and inspected at no additional cost to the Owner.
- E. The casing pipe shall conform to ASTM A 139, Grade B (without hydro-test) or ASTM A53, Grade B (without hydro-test), and AWWA C200-75. The carrier pipe shall be ductile iron restrained joint pipe as specified in Section 15006, unless otherwise noted herein or as shown on the Contract Drawings.
- F. Upon completion of carrier pipe installation, Contractor shall seal each end with a masonry wall.

2.02 TUNNEL LINER PLATE – (NOT USED)

2.03 GROUT – (NOT USED)

2.04 CASING SPACERS

- A. Contractor shall properly install and prevent the carrier pipe from floating by the use of casing spacers. Casing spacers shall be stainless steel, carbon steel, high-density polyethylene or combination thereof. The model of casing spacers shall correspond to the diameter of the carrier pipe and encasement pipe. Casing spacers shall fasten tightly onto the carrier pipe so that when the carrier pipe is being installed, the spacers will not move along the carrier pipe. Casing spacer placement along the carrier pipe shall be in accordance with the manufacturer's recommendations, minimum three spacers per pipe joint. Maximum distance between casing spacer and internal wall of casing pipe shall be 2-inches. The proposed procedure to install the carrier pipe is to "bell-up" the pipe outside the casing and push the carrier pipe through the casing. Casing spacers shall be manufactured by Advance Products and Systems, Cascade Waterworks Mfg. Co., Pipeline Seal and Insulator, Public Works Marketing, or approved equal.

2.05 JACKING/RECEIVING PITS

- A. Jacking/Receiving pits shall be excavated and backfilled in accordance with Section 02200 – Earthwork and meet all federal and state OSHA requirements for a safe excavation. Jacking/Receiving pits shall be located so as to not undermine pavements.

2.06 MASONRY WALL

- A. One (1) course of standard brick and mortar masonry wall shall be constructed at each end of casing pipe, flush with casing pipe opening, once carrier pipe is installed. Brick shall have a nominal size 2-1/4 inches by 3-3/4 inch by 8 inch. Mortar shall be one part Portland cement blended with three parts sand (100% passing #4 sieve and minimum 95% passing

No. 8 sieve) and have a minimum 7-day compressive strength of 500 psi. Prepared bag mixes are acceptable if approved by the Engineer.

PART 3 -- EXECUTION

3.01 INSTALLATION- GENERAL

- A. The Contractor shall be responsible for the design, adequacy and methodology of the jacked and bored/tunneled casing pipe installation. The Contractor shall submit the proposed method of installation, detailed layout information, methods to be implemented if unusual or adverse soil conditions (i.e.: running sand, water, etc.) are encountered during installation. Design certifications for installation method shall be sealed and signed by a professional engineer registered in the State of North Carolina to the Engineer for submittal to the N.C. Department of Transportation, Special Design Services prior to starting work. Where soils indicate a mixed face condition which indicates it would be difficult to maintain alignment, approval from NCDOT will be required not to use a full face tunnel shield.
- B. The Contractor shall provide either a bored and jacked or a tunneled and jacked casing pipe installation in accordance with these specifications, the Drawings and the approved NCDOT Encroachment Permit.
- C. If the Contractor elects to utilize a different method of installation for any NCDOT roadway crossings, details of the proposed methodology shall be submitted to and approved by the NCDOT and the Engineer.
- D. The recommended methods and details shown on the Drawings and specified herein, are intended to indicate the minimum acceptable standard of quality required for the casing and bore/tunnel installation. Other methods of installation, based on acceptable industry standards and techniques, may be acceptable for the installation. Under no conditions shall jetting or wet boring of the casing and bore/tunnel be allowed.
- E. All excavations and pits shall be well sheeted and braced as necessary for safe and adequate access for workmen, inspections, and materials and shall be of a size suitable to equipment and material handling requirements.
- F. All of the Contractors plans, specifications and design computations for pit shoring shall be sealed and signed by a Professional Engineer registered in the State of North Carolina.
- G. All pits required for the installation of the casing, bore/tunnel, and carrier pipe within NCDOT right-of-way shall be completely isolated from the roadway traffic with precast concrete barriers installed in accordance with the NCDOT Roadway Standard Drawings, Standard No. 150.02.

3.02 BORING AND JACKING

- A. Boring and jacking installations shall 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 casing pipe shall be 360° butt-welded, using a full depth, single "V" groove weld, to the next section previously jacked into place.

- B. The boring equipment to be used for installing the jacked casing shall be of such size and capacity to allow the boring to proceed in a safe and expeditious manner. The installation of the casing and boring of the hole shall be done as rapidly as possible and shall be done simultaneously to avoid voids, cave-ins or settlement and for safety of traffic above.
- C. A special lubricant may be used to facilitate movement or lessen the danger of jacked pipe from freezing.
- D. If voids are encountered or occur outside the casing pipe, grout holes shall be installed in the top section of the casing pipe at 4 foot (maximum) centers and the voids filled with 1:3 Portland Cement to sand grout with sufficient water added to produce a flowable mixture and at sufficient pressure to prevent settlement. **The Contractor shall be prepared to bore and jack through weathered or partially weathered rock, if encountered, with a specialized bit or hand-mine.** Costs associated with this provision shall be deemed as included in the unit price bid and no additional payment will be made.
- F. In the event an obstruction is encountered during the boring and jacking operation, and the casing pipe is at least 30-inches in diameter, the auger shall be withdrawn and the obstruction removed. If a bolder is encountered and is removed by blasting or other approved method, the void shall be filled with grout. For NCDOT roadway crossings, no blasting shall be permitted until a detailed blasting plan is submitted to and approved by the NCDOT, and the Engineer.

3.03 TUNNELING AND JACKING

- A. For tunnel and jack installation, casing shall be jacked through the soil progressively ahead of the leading edge of the advancing pipe as soil is hand-mined and mucked back through the pipe. As the tunnel and jack operation progresses, each new section of the casing pipe shall be 360° butt-welded, using a full depth, single "V" groove weld, to the next section previously jacked into place.
- B. The jacking equipment to be used for installing the jacked casing shall be of such size and capacity to allow the tunneling to proceed in a safe and expeditious manner. The installation of the casing shall be done as rapidly as possible and shall be done simultaneously to avoid voids, cave-ins or settlement and for safety of traffic above.
- C. A special lubricant may be used to facilitate movement or lessen the danger of jacked pipe from freezing.
- D. If voids are encountered or occur outside the casing pipe, grout holes shall be installed in the top section of the casing pipe at 4 foot (maximum) centers and the voids filled with 1:3 Portland Cement to sand grout with sufficient water added to produce a flowable mixture and at sufficient pressure to prevent settlement. **The Contractor shall be prepared to tunnel and jack through weathered or partially weathered rock, if encountered, with hand-mining.** Costs associated with this provision shall be deemed as included in the unit price bid for and no additional payment will be made.
- F. In the event an obstruction is encountered during the tunnel and jacking operation, the obstruction shall be removed. If a bolder is encountered and is removed by blasting or other approved method, the void shall be filled with grout. For NCDOT roadway crossings, no blasting shall be permitted until a detailed blasting plan is submitted to and approved by the NCDOT, and the Engineer.

3.04 CASING/BORE/TUNNEL ALIGNMENT

- A. The Contractor shall check the vertical and horizontal alignment of the casing/bore/tunnel by survey instrument at least once during each four feet of advance, or as directed by the Engineer.

3.05 CARRIER PIPE INSTALLATION

- A. For all casing installations the carrier pipe shall be installed with adequately designed and spaced pipe alignment guides "spiders", secured, and bulkheaded. The proposed procedure to install the carrier pipe is to "bell-up" the pipe outside the casing and push the carrier pipe through the casing.
- B. Following completion of the casing installation, the carrier pipe shall be installed, secured, bulkheaded. The proposed procedure to install "restrained joint" type carrier pipe is to "bell-up" the pipe outside the tunnel and push the carrier pipe through the tunnel. Blocking to prevent flotation shall be attached to the casing/tunnel prior to the installation of the restrained joint carrier pipe. Stationing of the blocking shall be such that when the pipe installation is complete, the blocks are located at the pipe bells. Blocking shall be set so that as the pipe slides through the tunnel, the pipe bells will have a clearance of $\pm 1/2$ ". In lieu of the wood cradle, adequately designed and spaced pipe alignment guides may be used to slide the carrier pipe along the concrete pipe cradle.
- C. Concrete brick and mortar bulkheads with air and water vent holes shall be constructed at the terminal ends of the casing/bore/tunnel.

3.06 SURFACE SETTLEMENT MONITORING

- A. Prior to the beginning of any casing/bore/tunnel excavation, a surface settlement monitoring grid system shall be installed on each roadway that is bored/tunneled under. This grid shall consist of PK nails installed along the casing/bore/tunnel centerline at ten foot intervals. Additional lines of PK nails shall be installed ten feet each side of the centerline. These points shall be initially read and the elevations recorded prior to the start of the casing/bore/tunnel construction. If no visible settlement is occurring during casing/bore/tunnel excavations, these points shall be read only at such times as the Contractor's surveyor is present to transfer the line and grade into the casing/bore/tunnel. These points shall be checked and elevations recorded on a semi-weekly (i.e., twice per week) basis, until the casing/bore/tunnel installation is completed.

3.07 SPECIAL CONSTRUCTION REQUIREMENTS FOR EXISTING EASEMENTS AND RIGHTS-OF-WAY

- A. Refer to encroachment requirements when working within NCDOT existing easements and/or rights-of-way.

- END OF SECTION -

SECTION 02500

SURFACE RESTORATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, equipment and materials required to perform and complete the restoration of all surfaces in the excavation and work area. The Contractor shall remove all surface materials of whatever nature and shall properly store, guard, and preserve as much material as may be required for restoration of disturbed areas. Topsoil or loam, where encountered, shall be piled separately from other excavated materials to prevent mixing and shall be backfilled to a compacted depth equal to the original condition.
- B. Depressions that occur along the line of excavation, due to the settlement, shall be brought to grade, restoring the surface to its original condition. Where trenches cross or disturb improved or unimproved driveways the ground surface shall be returned to its original condition by the Contractor at his own expense.
- C. All disturbed items on private property such as landscape items, property pins, fencing, special grasses, trees, plants, rock walls, and/or other items shall be repaired or replaced back to the original condition.
- D. All grassed and natural areas (including road shoulders) disturbed during the course of the work shall be reseeded.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

3.01 UNPAVED ROADS AND DRIVEWAYS

- A. On all unpaved roads and driveways, the Contractor shall strip and stockpile the existing crushed stone base. After construction, the Contractor shall restore the crushed stone base to its original condition. Additional crushed stone shall be provided by the Contractor at his expense if a suitable surface cannot be established.

3.02 DITCH AND SWALE EROSION PROTECTION

- A. All ditches and swales shown on the Drawings to receive erosion protection, shall be lined with an erosion retention blanket as shown on the Drawings and as specified under Section 02276.
- B. The area to be covered shall be properly graded and prepared, fertilized, and seeded before the blanket is applied. Unroll blanket so that the netting is on top and the fibers are in

contact with the soil. Install in direction of water flow. Staple ends and sides one (1) row alternately spaced down the center or as otherwise recommended by the manufacturer. The staples shall be driven vertically into the ground.

3.03 RESTORATION OF PAVED SURFACES

- A. Where trenches cross or disturb paved streets, driveways, parking areas, sidewalks and curbs, the Contractor shall remove where necessary and shall replace all portions of pavements, curbs, sidewalks, and driveways destroyed or damaged by his operation. The Contractor shall take all precautions to protect the existing pavement from damage by his equipment during construction. It is the intent of these specifications that the Contractor leave all paved surfaces affected by the construction work equal to or better than the original condition and that all work be done in conformance with approved practice.
- B. The Contractor shall be advised, when concrete sub-base is encountered under existing pavement, it shall be replaced with the flexible base pavement as described herein.
- C. The Contractor shall not begin final restoration work until the subgrade has been inspected and approved by the agency having authority over the rights-of-way. All pavement and road restoration within State or City/County owned rights-of-way shall be done as specified herein and as detailed on the Drawings, to the requirements of the North Carolina Department of Transportation Standard Specification, and to the approval of the North Carolina Department of Transportation District Engineer and the city having jurisdiction over the roadway.
- D. Unless otherwise directed, bituminous concrete binder course restoration shall be completed prior to the close of work each day allowing the trench to be exposed to traffic during non-working hours.
- E. Final flexible pavement restoration shall be deferred at least two (2) weeks after the trench area has been backfilled and exposed to traffic.
- F. The existing pavement shall be cut back with a pavement saw and squared off in a neat and workmanlike manner. In general, the base for bituminous pavements shall extend at least one (1) foot on undisturbed subgrade.

The following are the minimum pavement specifications that will be accepted under this Contract.

3.04 ASPHALTIC SURFACING WITH FLEXIBLE BASE PAVEMENTS

- A. Pavement Repair. Pavement repair for all roads or streets shall be as described herein and as shown on the Drawings. Materials and work shall be as follows:
- B. Asphalt Pavements

All work, including materials, associated with asphalt pavement shall be in accordance with Section 610, Asphalt Concrete Plant Mix Pavements, of the NCDOT Standard Specifications for Roads and Structures, except Articles 610-15 and 610-16 shall be deleted. Surface Course shall be Superpave S-9.5B, Intermediate Course shall be Superpave I-19.0B, and Base Course shall be Superpave B-25.0C. Asphalt pavement mix designs shall be in accordance with TABLE 610-2 of the NCDOT.

3.05 PAVEMENT MARKINGS

Where trenches cross or disturb paved streets containing pavement markings, the Contractor shall replace all pavement markings removed or damaged during construction. Pavement markings shall be replaced to their original configuration immediately following final pavement restoration, unless otherwise approved by the Engineer. Pavement markings shall be replaced in accordance with the Specifications and requirements of the North Carolina Department of Transportation District Engineer (for NCDOT roadways).

Pavement markings shall be replaced with same type markings as existing, on any pavement that is to be overlaid.

All pavement markings shall be subject to inspection by the North Carolina Department of Transportation and the municipality having jurisdiction prior to acceptance.

In areas where traffic control measures have been moved or are not currently being employed, the Contractor shall provide temporary regulatory and warning pavement markings or other means approved by the Engineer, for controlling traffic, until final pavement restoration is completed.

- END OF SECTION -

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SECTION 02510

PAVING AND SURFACING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish all labor, equipment and materials and perform all operations in connection with the construction of asphalt concrete pavement, asphalt concrete overlay, reinforced concrete pavement, gravel roads, concrete curb and gutter, repair and reconstruction of existing asphalt concrete pavement, repair of existing gravel roads, and pavement markings complete as specified herein and as detailed on the Drawings.
- B. All new roads including the replacement of portions of the existing roads shall be to the limits, grades, thicknesses and types as shown on the Drawings. Patches for pipe crossings and areas damaged during the construction work shall be asphalt and/or gravel, depending upon the material encountered, unless otherwise indicated.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Requirements of related work are included in Division 1, Division 2 and Division 3 of these Specifications.

1.03 STANDARD SPECIFICATIONS

- A. Unless otherwise noted on the Drawings, all work shall conform to the NCDOT Standard Specifications for Roads and Structures (2018 edition).

PART 2 -- MATERIALS

2.01 SELECT FILL

- A. The Contractor shall place select fill as necessary to complete the embankments, shoulders, subgrade foundation and replacement for removed unsuitable material in accordance with NCDOT Section 235, and Section 02220, Trenching, Backfilling and Compacting for Utilities.

2.02 GRAVEL

- A. All work, including materials, associated with gravel shall be in accordance with NCDOT Section 545, Incidental Stone Base, except that Articles 545-5 and 545-6, shall be deleted.

2.03 AGGREGATE STABILIZATION

- A. All work, including materials, associated with Aggregate Stabilization shall be in accordance with NCDOT Section 510, Aggregate Stabilization, except that Articles 510-5 and 510-6, shall be deleted.

2.04 AGGREGATE BASE COURSE (ABC)

- A. All work, including materials, associated with Aggregate Base Course shall be in accordance with NCDOT Section 520, Aggregate Base Course, except that Articles 520-11 and 520-12 shall be deleted. Type "A" or "B" aggregate will be acceptable for this project.

2.05 ASPHALT BINDER FOR PLANT MIX

- A. All work, including materials, associated with asphalt binder shall be in accordance with Section 620, Asphalt Binder for Plant Mix, Grade PG 64-22, of the NCDOT Standard Specifications for Roads and Structures, except Articles 620-4 and 620-5 shall be deleted.

2.06 ASPHALT PAVEMENTS

- A. All work, including materials, associated with asphalt pavement shall be in accordance with Section 610, Asphalt Concrete Plant Mix Pavements, of the NCDOT Standard Specifications for Roads and Structures, except Articles 610-15 and 610-16 shall be deleted. Surface Course shall be Superpave S-9.5B, Intermediate Course shall be Superpave I-19.0B, and Base Course shall be Superpave B-25.0C. Asphalt overlays shall be 59.5B. Asphalt pavement mix designs shall be in accordance with TABLE 610-2 of the NCDOT.
- B. The job mix formulas shall be delivered to the Engineer at least two (2) weeks prior to beginning paving operations.

2.08 CONCRETE CURB AND GUTTERS

- A. Concrete shall be Class B in accordance with the requirements of Section 03300.
- B. Premolded expansion joint filler for expansion joints shall conform to ASTM D 1751 and shall be 1/2-inch thick, minimum.

2.09 ASPHALT TACK COAT

- A. All work, including materials, associated with asphalt tack coat shall be in accordance with Section 605, Asphalt Tack Coat, of the NCDOT Standard Specifications for Roads and Structures, except that Article 605-10 shall be deleted.

PART 3 -- EXECUTION

3.01 WEATHER RESTRICTIONS

- A. The placing of concrete or asphalt concrete surface paving shall be subject to the Seasonal and Weather Restrictions set forth in NCDOT Specifications.

3.02 SUBGRADE

- A. The subgrade, where shown on the Drawings, shall be aggregate stabilized by the addition and mixing of coarse aggregate with the top 3-inches of subgrade in accordance with NCDOT Section 510-4. Aggregate stabilization shall be applied to the subgrade at a rate of 300-pounds per square yard. Following the application of stabilizer aggregate, the

subgrade shall be formed true to crown and grade, and shall be compacted to conform to the maximum densities determined by AASHTO T99 Standard Specifications.

3.03 BASE COURSE

- A. The finished base course of all paving shall be B-25.013 and shall be of the thickness shown on the Drawings, formed true to crown and grade. Gravel roads, including repair to existing gravel roads and driveways shall be ABC and shall be of the thicknesses shown on the Drawings, or to match existing road, whichever is greater, formed true to crown and grade. No fill material except new ABC shall be placed on top of existing gravel.

3.04 ASPHALT BASE COURSE (OR INTERMEDIATE COURSE)

- A. Asphalt Concrete Base (or Intermediate) Course shall be placed in accordance with NCDOT Standard Specifications for Roads and Structures 610-8, Spreading and Finishing. Asphalt Concrete Base (or Intermediate) Course shall be compacted in accordance with NCDOT Standard Specifications for Roads and Structures 610-9, Compaction. Thicknesses shall be as shown on the Drawings.

3.05 ASPHALT CONCRETE SURFACE COURSE

- A. Prior to placement of the asphalt concrete surface course, the base/intermediate course shall be inspected for damage or defects and repaired to the satisfaction of the Engineer. The surface of the base/intermediate course shall be approved by the Engineer.
- B. The asphalt tack coat shall be applied to the surface of the approved base/binder course as described in NCDOT Section 605. Equipment for applying the tack coat shall be power-oriented pressure spraying or distributing equipment suitable for the materials to be applied and approved by the Engineer.
- C. The Asphalt Concrete Surface Course shall be placed and compacted on the base/intermediate course in layers not to exceed 2-inches and at the rate of 110-pounds per square yard per inch. Surface Course shall be compacted in accordance with NCDOT Standard Specification for Roads and Structures, Article 610-9. Thicknesses shall be as shown on the Drawings.

3.07 CONCRETE CURB AND GUTTER

- A. The expansion joint filler for concrete curb and gutters shall be cut to conform with the cross section of the curb. Expansion joints shall be spaced at intervals of not more than 25-feet. Formed control joints shall be installed at intervals not exceeding 10 feet. Depth of joint shall be 1/3 the thickness. Curved forms shall be used where radii are indicated; straight segments shall not be permitted. Upon removal of the forms, exposed curb faces shall be immediately rubbed down to a smooth and uniform surface. No plastering shall be permitted.

3.08 UNDERGROUND UTILITY LINES

- A. Where an underground utility line is beneath the new roadway, the backfilling shall be carried out with special care, and the final consolidation shall be accomplished by a vibratory roller. Construction of the roadway over the trench shall be deferred as long as practicable.

3.09 JUNCTION WITH OTHER PAVING

- A. Where new asphalt concrete pavement abuts existing asphalt concrete pavement, the existing pavement shall be cut back to insure obtaining the specified compaction of the new pavement courses and interlocking adjoining courses. Existing subbase courses shall be cut back from the subgrade level of the new pavement on a one-on-one slope into the existing pavement, and the asphalt courses of the existing pavement shall be removed for an additional 6-inches back from the slope. The edge of the existing asphalt courses shall be saw cut straight and true. The faces between new and existing asphalt courses shall receive an application of tack coat.
- B. Where new rigid concrete pavement abuts existing rigid concrete or asphalt concrete paving, the existing paving shall be saw cut straight and true. An expansion joint of a 1/2-inch minimum thickness with filler material and sealant shall be placed between the new concrete pavement and the existing rigid concrete or asphalt concrete paving.

3.10 ASPHALT CONCRETE OVERLAY

- A. Where asphalt concrete is proposed to be placed over an existing asphalt for NCDOT roadways, the surfaces shall be thoroughly cleaned by power brooming and a tack coat shall be applied in accordance with NCDOT Section 605, Asphalt Tack Coat, of the NCDOT Standard Specifications for Roads and Structures, prior to installing the overlay. The overlay shall be applied in accordance with Subsections 2.06 and 3.05 and Standard Details shown on the Drawings.

- END OF SECTION -

SECTION 02559

STREAMBED MATERIAL FOR STREAMWORK (SBM)

PART 1 – GENERAL

1.01 SUMMARY

- A. This work shall consist of salvaging, stockpiling, sorting and then placing existing streambed and/or bar material (SBM) within the project area for channel and slope stabilization in accordance with the Construction Documents. Salvaged SBM may be used for “chinking”, grade control or other purposes. If sufficient quantities of SBM are not available from the project site, additional material shall be furnished.
- B. Related Sections:
 - 1. Section 02241, Dewatering and Flow Diversion for Streamwork

1.02 SUBMITTALS

- A. Per Section 01300, Submittals

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Where possible, existing SBM shall be harvested to a depth of eighteen (18) inches on portions of stream reach shown on the Contract Documents.
- B. Material shall be sorted into three categories as follows:
 - SBM 1: Gravel to Small Cobble (0.5 to 5 inches)
 - SBM 2: Small to Large Cobble (5 to 12 inches)
 - SBM 3: Small to Large Boulders (12 to 36 inches)
- C. Sorting can be made with visual judgment but stockpiled SBM must be field-approved by the Owner or the Owner’s Agent prior to use; unsuitable material will be rejected. Effort for all sorting is considered incidental to work described under Section 02200, Earthwork, including any required sediment control work needed for stockpiling. Based on consultation with and approval by the Owner or the Owner’s Agent (onsite, documented inspection), SBM may be removed from the stream and placed directly onto work areas without intermediate stockpiling.
- D. SBM may contain fines and organic material (material smaller than 0.5 inches), so long as this percentage is no more than 20% for SBM 1 or 10% for SBM 2 or SBM 3.
- E. SBM 2 material may contain up to 20% of total material less than five (5) inches, including fines. SBM 3 material may contain up to 20% of total material less than twelve (12) inches, including fines.

- F. The presence of trash, domestic debris, toxins or other deleterious materials is not permitted. Unsuitable materials must be removed from the site and disposed of legally at the Contractor's expense.

PART 3 – EXECUTION

3.01 STREAM BED MATERIAL (SBM) PLACEMENT

- A. SBM shall be removed from the streambed by scraping with an excavator bucket or shovel and placed directly onto work areas or stockpiled for sorting and mixing.
- B. SBM used for chinking or filling of voids of other revetment/grade control practices shall be worked into the previously placed revetment material until voids are filled.
- C. SBM used as bedding material for other revetment/grade control practices shall be placed to the depth specified on the Construction Documents then tamped lightly with excavator bucket or equivalent.
- D. SBM used to augment purchased stone to be used for revetment/grade control material shall be mixed with purchased material, then placed.

- END OF SECTION -

SECTION 02604

UTILITY STRUCTURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all materials, labor, equipment, and tools required for the design, fabrication, delivery and installment of utility structures and appurtenances in accordance with the Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200 - Earthwork
- B. Section 03200 - Reinforcing Steel
- C. Section 03300 - Cast-in-Place Concrete
- D. Section 03400 - Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. Federal Specification No. SS-5-00210 - Gaskets
 - 2. ASTM C478 - Specification for Precast Reinforced Concrete Manhole Sections
 - 3. A48, Standard Specifications for Gray Iron Castings
 - 4. A536, Standard Specifications for Ductile Iron Castings
 - 5. C923, Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes

1.04 SUBMITTALS

- A. Submit samples and/or Shop Drawings in accordance with Section 01300, Submittals.
- B. In addition to items listed in Section 03400, Precast Concrete, Shop Drawings shall include, but not be limited to:
 - 1. Complete layout and installation Drawings and schedules with clearly marked dimensions.

2. Material certificates on all piping materials.
3. Structural design calculations and drawings signed and sealed by a Professional Engineer currently registered in North Carolina. Design calculations for precast manholes and vaults shall include confirmation structures adequately resist flotation when they are totally empty and subjected to groundwater full height of structure.
4. Results of leakage test
5. Indicate knockout elevations for all piping entering each manhole.
6. Concrete ballast calculations for all buried concrete structures signed and sealed by a Professional Engineer registered in North Carolina.

PART 2 -- PRODUCTS

2.01 PRECAST MANHOLES, VAULTS, AND METER BOXES

- A. Precast utility structures shall be furnished with waterstops, sleeves and openings as noted on the Drawings. Box out for wall pipes shall conform accurately to the sizes and elevations of the adjoining pipes. Precast utility structures shall be watertight and conform to the requirements of ASTM C 478 with the following modifications there to:
 1. Materials shall conform to Section 03400, Precast Concrete.
 2. Manholes shall meet the following:
 - a. Manhole diameters are indicated on the Drawings. Manway openings shall be 30" for manhole diameters 5'-0" and larger and 24" for 4'-0" manholes. All manhole components shall conform to HS-20 loadings.
 - b. Minimum manhole wall thicknesses shall be 1/12 of the inside diameter with a minimum thickness of 5".
 - c. Manholes shall include ballast concrete and/or other means necessary to insure manholes resist flotation when empty and subjected to groundwater full height of structure.
 - d. Cone sections shall be eccentric with inside face of one side vertical and flush with the inside face of the barrel section. Minimum height shall be 40-inches for 5-foot diameter manholes.
 - e. Concrete grade rings shall have minimum wall thickness of 7" and be same wall thickness as the top of the cone section. Steel reinforcement shall be as required by ASTM C-478 and shall not be less than 2 full rings of #3 bars. Minimum vertical height of concrete grade rings shall be 4". HDPE adjustment grade rings may be used in roadways, parking lots and driveways. HDPE adjustment rings shall be as manufactured by Ladtech, Inc. or approved equal.

- f. Precast manholes shall be as manufactured by Dellinger Precast, Tindall Precast, Oldcastle Precast, or equal. Precast Mono Bend manholes may be used where proposed angles between sewer lines meet manufacturer's minimum turning angle requirements.
 - 3. The date and name of manufacturer shall be marked inside each precast section in accordance with ASTM C478.
 - 4. No more than two lift holes may be cast or drilled in each section.
 - 5. Dimensions shall be as shown on the Drawings.
 - 6. Mechanical details such as piping, electrical, and other details shall be as shown on the Drawings.
- B. Joints between manhole riser sections and at base slabs shall be groove type.
- 2.02 BRICK
- A. Brick shall be sound, hard-burned common brick conforming to ASTM C32, Grade MS.
- 2.03 CONCRETE
- A. Concrete shall conform to Section 03300, Cast-in-Place Concrete.
- 2.04 REINFORCING
- A. Reinforcing shall conform to Section 03200, Reinforcing Steel.
- 2.05 PRECAST CONCRETE
- A. Precast concrete shall conform to Section 03400, Precast Concrete.
- 2.06 CONCRETE BLOCK
- A. Concrete block shall be solid, rectangular concrete masonry units conforming to ASTM C139.
- 2.07 STEPS
- A. Steps shall be ASTM C478 and constructed of Grade 60 steel reinforcing rod (min. 1/2-inch) conforming to ASTM A615 and completely encapsulated with a wear resistant and chemical resistant rubber meeting ASTM D4101.
 - B. Each step shall have a minimum vertical load resistance of 800 pounds and a minimum pull-out resistance of 1,000 pounds.
 - C. The steps shall have 12-inch minimum tread width and shall be placed at 16-inches on center.

- D. Steps shall be cast in place with the concrete and shall be manufactured by MA Industries, BOWCO Industries, or American Step Company.

2.08 JOINT SEALANT

- A. Joints between sections shall be manufactured in accordance with ASTM C-443. Joints may be sealed with rubber gaskets in accordance with ASTM C-443 or with butyl rubber sealants conforming to ASTM C-990. Butyl rubber joint sealants shall meet or exceed requirements of ASTM C-990 including 10 PSI hydrostatic test measurement. Butyl rubber joint sealants shall be Butyl-Tite by MultiSeal, Butyl-Loc by A-LOK Products, EZ-Stik Sealant by Press Seal Gasket Corporation, CS102 by ConSeal Concrete Sealants, or approved equal.
- B. Exterior joint wrap shall meet ASTM C-877 Type III and ASTM C-990. Joint wrap shall be minimum of 6 inches wide and not less than 1.5 times joint depth. Butyl component of joint wrap shall be a minimum of 90.030 inches (3 mils) thick. Exterior joint wrap shall be EZ-Wrap by Press-Seal Gasket Corporation, CS-212 by ConSeal Concrete Sealants, Butyl-Tite Wrap by MultiSeal, Bidco Wrap by NPC Corporation or approved equal.

2.09 FLEXIBLE RUBBER SLEEVE

- A. The spring set type shall have a stainless steel interior power sleeve or expander and shall be the Press-Seal 802 by Press-Seal Gasket Corporation, the Kor-N-Seal assembly by National Pollution Control Systems, Z-LOK Boot System as manufactured by A-LOK Products, Inc. or approved equal. Compression type connectors will not be permitted on this project.
- B. The cast-in-place type shall conform to ASTM C923 and shall include stainless steel take up clamps.
- C. Flexible seal assemblies shall permit at least an eight (8) degree deflection from the center line of the opening in any direction while maintaining a watertight connection.

2.10 RUBBER BLADDER

- A. The rubber bladder seal shall conform to ASTM C923 suitable for pressure testing at 10 psi minimum, with a 3/8 inch minimum wall thickness.
- B. The rubber bladder seal shall contain an environmentally safe, anti-bacterial compound which turns into a high viscosity gel when in contact with pressurized water.
- C. The rubber bladder seal shall be NPC Contour Seal by Kor-N-Seal, or equal.

2.11 COVERS AND FRAMES

- A. Covers and frames shall be provided by the utility structure manufacturer.
- B. Manhole covers and frames shall meet the following requirements:
 - 1. ASTM A48, Class 35 (minimum)

2. Heavy duty construction with a minimum total weight as indicated on details
 3. Locate so that there is ready access to the manhole steps
 4. Clear opening per Paragraph 2.01.A.2.a.
 5. Standard and sealed manhole frames shall be 190 lbs, bolted into structure. Covers shall be 120 lbs as manufactured by US Foundry (699), Vulcan (1384), or approved equal.
- C. All frames and covers shall be given one shop coat of asphalt or coal tar varnish, unless otherwise specified.
- D. Frames and covers shall be as shown per the Standard Details in the Contract Drawings.
- E. The words "Union County PW", "Confined Space Permit Required", and "Sanitary Sewer" shall be cast in raised lettering on all covers as indicated per the Stand Details in the Contract Drawings.
- 2.12 CONCRETE BALLAST
- A. Concrete ballast shall be Class B concrete in conformance with Section 03300, Cast-in-Place Concrete. Ballast shall be provided as necessary to insure manhole resists flotation when empty and subjected to full height groundwater conditions.
- 2.13 FLEXIBLE JOINT SEALER
- A. Flexible joint sealer shall be a rubber ring waterstop as manufactured by Fernco Joint Sealer Co., or equal.

PART 3 -- EXECUTION

3.01 DESIGN CRITERIA

- A. Precast items subjected to vehicular traffic shall be designed for HS-20 traffic loading.
- B. Walls of precast items shall be designed for a vertical surcharge of 100 psf.
- C. Precast manholes and vaults shall be designed to resist flotation when totally empty and subjected to groundwater full height of the manhole.

3.02 FABRICATION AND CASTING

- A. Fabrication and casting shall conform to Section 03400, Precast Concrete, and to Section 03300, Cast-in-Place Concrete.
- B. All base sections designated to receive concrete ballast and all electrical manholes shall extend monolithically a minimum of 6 inches beyond the outside face of the wall for the entire periphery. All other utility structures shall have a standard base.

- C. Utility structures built around existing pipe shall have a cast-in-place base slab.

3.03 HANDLING, TRANSPORTING, AND STORING

- A. Handling, transporting and storing of precast items shall comply with Section 03400, Precast Concrete.

3.04 INSTALLATION

- A. Installation shall conform with Section 03400, Precast Concrete and with the manufacturer's recommendations or to Section 03300, Cast-in-Place Concrete.

- B. Frames and covers or grates shall be set so that tops are at elevations indicated on the Drawings or flush with finished grade where no elevation is indicated.

- C. Joints between riser sections shall be sealed with joint sealant.

- D. All openings in utility structures shall have flexible rubber sleeves sized to fit the connecting pipe and installed to provide watertight joints in accordance with the manufacturer's recommendations. The interior of the sleeve shall be filled with Class B concrete.

- E. Openings that are too large for flexible rubber sleeves shall utilize rubber bladder seals which are expanded by water injected using a pressure pump.

- F. All units shall be installed plumb and level.

- G. All lift holes and joints shall be filled with non-shrink grout.

- H. The manhole frames shall be set to their required elevations either with grade rings or with two or three courses of brick masonry laid around the top of the upper wall section. Such brick work shall be given a 1-inch mortar coat on the inside and out.

- I. Concrete ballast shall be placed so that it bears directly on the utility structure base against the outer wall monolithically encircling the structure for the full height indicated on the Drawings. Additional ballast may be required where the depth or elevation of the structure varies from the Drawings.

- J. Brick or Concrete Block

Brick or concrete block shall be laid with broken joints and all horizontal and vertical joints filled with cement-sand mortar. Outside of walls shall be plastered with a minimum 1-inch thick coat of cement-sand mortar troweled smooth.

- K. Connection to Existing Pipe

1. Verify the diameter and invert elevation of existing pipe to be connected to new utility structures prior to beginning work on the structures.

2. Provide adequate protection to prevent damage to the existing pipe.

3. Provide adequate means for plugging and/or transferring the existing flow in the pipe to allow for the construction of inverts and grouting.
 4. Cut off the existing pipe sufficiently for connection to the new structure and remove.
 5. Thoroughly clean all foreign matter and coat the pipe surface with epoxy adhesive where the pipe joins the new structure.
 6. Install a flexible joint sealer around the pipe.
 7. Grout inside and outside of wall penetration with nonshrink grout.
- L. Backfill structures in accordance with Section 02200, Earthwork.
- M. Clean all structures of any accumulation of silt, debris, or foreign matter and keep clean until final acceptance of the work.
- N. Excavation shall conform to Section 02200, Earthwork.
- O. Structure bases shall bear on a minimum of 12 inches of compacted stone unless otherwise indicated on the Drawings.
- P. Channel Inverts
1. Inverts shall be placed using Class B concrete with forms sufficient to provide a smooth half-round shape. Manhole bases employing full depth precast inverts are acceptable.
 2. Where the slope of the line does not change through a manhole, a constant slope shall be maintained in the invert. Where slope changes occur within a given manhole, the transition shall be smooth and shall occur at the approximate center of the manhole.
 3. Inverts shown on the Drawings are taken at the center of the manhole unless otherwise noted.
- Q. Vent Pipes
1. Vent pipes shall be fabricated from 5-inch diameter, steel pipe (Schedule 40).
 2. Vent pipes shall be provided with insect screens.
 3. Vent pipes shall be coated in accordance with Section 09900, Painting.
- 3.05 ADJUSTMENTS TO EXISTING UTILITY STRUCTURES
- A. Adjust structures as indicated on the Drawings using concrete or cast iron adjustment rings by approved methods.
 - B. Clean covers and inlet castings of all foreign material and paint with one coat of coal tar epoxy.

3.06 ADJUSTING COLLARS AND FINAL ADJUSTMENTS

- A. Adjusting collars shall be as shown on the Drawings. Final adjustments shall be made so that the manhole ring and cover will be smooth and flush with the finished grade of the adjacent surface, or as otherwise indicated on the Drawings for manholes shown above grade.

3.07 LEAKAGE TEST FOR MANHOLES

- A. All manholes shall be tested by either the hydrostatic or vacuum test method as specified below. Refer to Section 15000 for pipe testing methods and requirements.
- B. Hydrostatic Test – Manholes and (other structures where scheduled) shall be hydrostatically tested by plugging all pipes in the manhole and filling manhole with water to the rim. Allow the level to equalize due to saturation. Refill manhole to begin test. Test shall be 2-hour minimum. Allowable leakage is three (3) gallons per hour, total six (6) gallons for test. If manhole fails test, drain manhole, repair leak(s) and re-test until manhole passes leakage test.
- C. Vacuum Test - With approval from Owner/Engineer, manholes that cannot reasonably be hydrostatically tested may be vacuum tested. All Manholes shall be vacuum tested as specified below and in accordance with Tables 1 and 2 on Page 02604-8.
 - 1. Testing shall be done in accordance with ASTM C1244-05 (or latest revision).
 - 2. Prior to testing, all pipes, holes, and vents entering manhole shall be plugged and braced.
 - 3. Contractor shall have an approved test head and copy of instructions for use by the manufacturer.
 - 4. Contractor shall furnish two (2) certified and calibrated vacuum test gauges for the test.
 - 5. A vacuum of 10-inch 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 for the vacuum pressure to drop to 9-inch hg shall be measured. If the test time meets or exceeds the test time as specified in the table below, the manhole is acceptable; otherwise, the test has failed and the manhole should be checked for leaks, corrected, and re-tested. For sizes and depths of manholes not given in the table, test time shall be calculated as specified herein.

Table 1
Minimum Vacuum Test Times (Seconds) for Various Manhole Diameters and Depths

Manholes Ø (inches)							
Depth (ft)	48	60	72	84	96	108	120
6'	15	20	25	29	34	38	43
8	20	26	33	38	45	51	57
10	25	33	41	48	56	63	71
12	30	39	49	57	67	76	85
14	35	46	57	67	78	89	100
16	40	52	67	76	89	101	114
18	45	59	73	86	100	114	128
20	50	65	81	95	111	126	142
22	55	72	89	105	122	139	156
24	59	78	97	114	133	152	170
26	64	85	105	124	144	164	185
28	69	91	113	133	155	177	199
30	74	98	121	143	166	189	213

Table 2
Q cfm Allowable for 1.0 psi drop (1 inch Hg)

Manhole Diameter	Q loss (cfm)	Manhole Diameter	Q loss (cfm)
48"	10	84"	16
54"	11	96"	18
60"	12	102"	19
66"	13	108"	20
72"	14	112"	21
78"	14	120"	22

6. The following formula is to be used for calculation of vacuum test time for manholes and depths not given in the table:

$$T_{vac} = 0.00018 \left[\frac{D^2}{Q} \right] * H$$

Where T_{VAC} = Time Length for Test (min)
D = Dia. MH (inches)
Q = Allowable cfm Air Loss for 1.0 in. hgi drop (0.490 psi)
H = Depth MH, (feet)

Example: Test 48" Ø MH @ 10' depth; From Table 2, allowable Q = 10 cfm

$$T_{vac} = 0.00018 \left[\frac{48^2}{10 \text{ cfm}} \right] * (10 \text{ feet})$$

Where: T_{VAC} = 0.41 minutes = 25 seconds

- D. Cost of Testing and Repairs - The Contractor shall provide all water, plugs, hoses, pumps, equipment, etc. necessary for the proper flushing and testing of the manholes and all costs shall be included in Pay Item B.

- END OF SECTION -

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SECTION 02665

TEMPORARY BYPASS PUMPING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Under this item the Contractor is required to design and furnish all materials, labor, equipment, power, fuel, fuel storage, maintenance, etc. to implement a temporary pumping system as required to facilitate tie-in connections to existing sewers.
- B. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility throughout the duration required. All components of the temporary bypass pumping system shall be provided by the Contractor.
- C. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction. Contractor shall also be responsible for any fines imposed by local, state, and/or federal agencies for failure to maintain flows or contain spills and/or overflows.
- D. The Contractor shall implement best management practices to prevent and minimize erosion and resultant sedimentation during all bypass pumping activities in accordance with Section 02276 – Erosion and Sedimentation Control.
- E. Contractor's Bid shall be based on maintaining operation of the bypass pumping operation at all times during active construction of project.
- F. Contractor shall be responsible for maintaining the existing gravity sewers in service without wastewater spills during the entirety of the construction period when the bypass pumping system is NOT in operation.
- G. Contractor has the option to provide either intermittent or continuous temporary bypass pumping per Paragraphs 1.01.H and 1.01.I.
- H. Intermittent bypass pumping shall only be operated between the hours of 7:00 a.m. and 5:00 p.m., Monday through Friday, when the Contractor is on-site and working.

At the end of each work day, the Contractor shall test the new sewer lines installed and re-connect the existing sewer line to the new sewer line to re-establish gravity flow through the entire system. Connection between existing and new sewer lines shall be made with couplings and/or sleeves for a solid, leak-tight connection.

- I. Continuous bypass pumping is allowed. If the Contractor elects to continuous bypass pump, then the bypass pumping operation must be manned at all times (i.e., 24 hours per day and 7 days per week). Continuous bypass pumping shall not be allowed to occur during weekends (between 5:00 pm Friday and 7:00 am the following Monday) and holidays.

When continuous bypass pumping is suspended, the Contractor shall re-connect the existing sewer line to the new sewer line to re-establish gravity flow through the entire

system. Connection between existing and new sewer lines shall be made with couplings and/or sleeves for a solid, leak-tight connection.

1.02 VENDOR REQUIREMENTS

- A. The vendor shall demonstrate the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator. The vendor shall have a minimum experience of 5 years designing and supplying wastewater bypass systems.
- B. The vendor shall demonstrate sufficient service and repair parts in stock to fulfill any service or repair of all rental equipment within three hours of any service call.
- C. The vendor shall demonstrate sufficient service staff, trucks, and inventory to mobilize to repair, service, or replace equipment within one hour of a service call, twenty-four hours per day, seven days per week.
- D. The contractor shall provide a list of phone and pager numbers to call for twenty-four hour service.

1.03 SUBMITTALS

- A. Bypass Pumping Plan: The Contractor shall submit to the Engineer for review and approval detailed drawings and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows. The plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Contract Documents. No construction shall begin until all provisions and requirements have been reviewed by the Engineer. The plan shall include, but is not limited to, the following details:
 - 1. Staging areas for pumps
 - 2. Plugging methods and types of plugs
 - 3. Number and size of pumps and basis of selection
 - 4. Number, size, material, method of installation, and location of suction piping
 - 5. Number, size, material, method of installation, and location of discharge piping
 - 6. Bypass pump sizes, capacity, number of each size to be on site, and power requirements
 - 7. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range are to be submitted). All hydraulic calculations and drawings shall be provided by the Bypass Pumping Vendor and stamped by a registered Professional Engineer licensed in the State of North Carolina.
 - 8. Thrust and restraint block sizes and locations

9. Method of protecting discharge manholes or structures from erosion and damage
10. Sections showing suction and discharge pipe depth, embedment, select fill, special backfill, and restraint
11. Method of noise control for each pump
12. Any temporary pipe supports and anchoring required
13. Design for access to bypass pumping locations indicated on the drawings
14. Selection of bypass pumping pipe size and material (include method of connections to pump and other piping)
15. Schedule for installation of and maintenance of bypass pumping lines
16. Describe how bypass pumping system will be monitored
17. Demonstrate upstream manholes will not overflow from surcharging and that upstream service connections will not be surcharged
18. Show discharge from force main will not surcharge downstream discharge manhole
19. Show 100% standby for pumps, power, controls, suction piping, and discharge piping
20. Show force main pipe material and thickness can withstand all normal operating and surge pressures with a safety factor of 2.0
21. Denote any conditions that will cause pumps to lose suction lift (prime) and describe procedures to rectify
22. Show that the emergency switchover from primary to secondary pumping will be automatic should equipment fail
23. Show emergency plan to be used if flooding occurs at work site
24. Show suction and discharge piping is protected from possible damage from varying creek flows and construction activities
25. Show any planned shifting of bypass equipment during construction

B. Sequence of Construction Plan: Furnish in accordance with Section 01300 – Submittals.

1. Contractor's Sequence of Construction defining work to be performed, including the following items:
 - a. Definition of the start date, duration and end date
 - b. Define activities to be performed by or witnessed by the Owner and date on which these activities are to be performed.

- c. Scheduling/timing of manufacturers field services, as specified.
2. Interruption of the operation of the existing sanitary sewer is required to perform the Work. Define the purpose for the interruption, date and time of interruption, and duration of interruption.
3. Provide complete list of equipment and material that is required to perform each segment of work.

PART 2 -- PRODUCTS

2.01 PUMPING EQUIPMENT

A. General:

1. This sanitary sewer is part of a regional system that must be kept in service at all times. It is essential to the operation of the existing wastewater system that there shall be no interruption in the conveyance of wastewater throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing system downstream of his work.
2. It is the Contractor's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work, and shall be subject to review by the Owner's representative at any time within the duration of the Contract. All Work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.
3. Wastewater system operational requirements take precedence over Contractor activities. Therefore, interruption of wastewater system operations must be coordinated and are subject to the operational requirements of the Owner. Contractor shall assume that any interruption of wastewater system operations may be deferred by up to one (1) week from the requested time due to operational constraints.
4. The Contractor shall provide for utilities and services for its own operations. The Contractor shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the Work.
5. The pumps shall be diesel powered and shall be equipped with sound attenuation equipment capable of reducing noise to 90 dB. Noise shall be measured within 3-feet of the sound attenuation enclosure.
 - a. Contractor shall be responsible for providing and storing a sufficient quantity of diesel fuel on-site to continually operate the pumps for the duration of the

temporary bypass pumping period.

- b. Contractor shall check the pump fuel levels and shall re-fill the tanks to full capacity on a daily basis.
6. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of the flows.
 7. Each pump and driver shall be rated for continuous duty operation over the specified range of conditions without cavitating or overheating, and without excessive vibration or noise. In addition, each pump and driver shall be rated to operate intermittently at shut-off head against a closed discharge valve for periods of not less than 5 minutes without excessive cavitation, overheating, or vibration.
 8. Furnish each pump with the necessary stop/start controls.
 9. Contractor will not be permitted to stop or impede the main flows under any circumstances.
- B. Temporary Bypass Pumping Requirements: The Contractor is responsible for the construction of the bypass pumping facilities as described. Requirements for the bypass pumping system is as follows:
1. Bypass pumping system is required to be operated continuously during daily construction activities while the existing sanitary sewer is modified.
 2. Contractor shall determine the number of pumps required to convey the bypass pumping flows listed in this Section. Contractor shall provide a 100% redundant separate backup system for all components (pumps, power, controls, piping, etc.) of the bypass pumping system. The backup pump shall be piped into the suction and discharge headers and shall be on-line, isolated from the primary system by a valve.
 3. No data is available regarding average and peak flows for the existing 8" diameter and existing 18" diameter gravity sewers. It is the responsibility of the Contractor to ensure that the systems furnished are adequately sized for the application. However, in no case shall the bypass pumping equipment be sized to pump raw wastewater at a flow rate less a full-pipe flow at the slope and grade of the existing sewer lines.

Due to varying ranges of flow from average to peak, variable speed or staged pump sizes will be required to avoid surcharging the lines and excessive pump reprime cycles shall be avoided to prevent sewer backups in the collection system. At no time shall depth exceed 3 feet in the manhole being pumped from.

Contractor has the option of placing by-pass pumps to either maintain flow from manhole to manhole on a daily basis or maintain by-pass operation in segments of line as indicated above. Contractor shall low pressure test line in accordance with Contract Documents prior to placing segment of line back in service. Manholes shall be vacuum tested immediately following line test. Contractor will have by-pass pumping facilities manned at all times during operation.

4. Provide all pipeline plugs, pumps of adequate size to handle the peak daily flow, and temporary discharge piping to ensure that the total sanitary sewer flow can be safely diverted around the work area while the sanitary sewer is modified. Wet weather flow projections are estimated. Contractor has the options of either sizing by-pass pumps for the wet weather flow, or provide contingency plan of placing pipe or keeping pipe in service in the event of wet weather flow.
5. The Contractor shall make all arrangements for bypass pumping during the time when the sanitary sewer is being modified for any reason.
6. Discharge piping shall be constructed of steel, ductile iron, or polyethylene pipe with positive, restrained joints. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.
7. Operation: The bypass pumps are to have variable capacity by controlling the speed of the diesel engine. Each pump shall have a separate control panel.
8. Provide pressure and vacuum gauges on the suction and discharge headers.
9. Provide pressure switches to start and stop the pumps and a pressure transmitter to vary the speed of the pumping units.

PART 3 -- EXECUTION

3.01 PREPARATION

- A. The Contractor is responsible for locating any existing utilities in the area where the Contractor selects to locate the bypass pumps and pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor under the unit price pay item for Temporary Bypass Pumping.
- B. During bypass pumping operations, the Contractor shall protect the wastewater system, including the sanitary sewer and manholes, from damage inflicted by his equipment. The Contractor shall be responsible for all physical damage to the wastewater system caused by human or mechanical failure.
- C. Contractor shall keep spare parts for pumps and piping on-site as requested. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.02 INSTALLATION AND REMOVAL

- A. The Contractor shall pipe sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access location and as may be required to provide an adequate suction conduit.
- B. The temporary bypass pumping system shall be tested before placing the system in operation. Testing periods shall occur only between the hours of 8:30 a.m. and 3:00 p.m.,

Monday through Thursday. Testing of bypass pumping system shall NOT be allowed Friday through Sunday, on the Owner's scheduled Holidays, or on the day immediately prior to an Owner's scheduled Holiday. In addition, testing of bypass pumping system shall only be performed during the Owner's normally scheduled work days. Testing shall include leakage testing, pressure testing, and operational testing.

1. Leakage and pressure test: Contractor shall perform leakage and pressure testing for a minimum of two (2) hours on the pump duty suction piping and duty discharge piping in accordance with Article 3.03, Paragraph A. Contractor shall then remove the duty piping and shall install the standby suction piping and standby discharge piping and perform the same test for an additional two (2) hours.
 2. Operation test: Contractor shall operate the temporary bypass pumping system for as long as necessary to demonstrate reliable operation of the entire system, including but not limited to pumps and controls, to the satisfaction of the Owner.
- C. Plugging or blocking of wastewater flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance of the work, the plugs are to be removed in a manner that permits the wastewater flow to slowly return to normal without surge, surcharging, or causing other major disturbances downstream.
- D. At the conclusion of the bypass pumping operation and once written permission is granted by the Owner and Engineer, Contractor shall remove all temporary bypass components and restore the site to original conditions to the satisfaction of the Owner and Engineer.

3.03 QUALITY CONTROL AND MAINTENANCE

- A. Testing: Contractor shall perform leakage and pressure tests of the bypass pump suction and discharge piping using clean water prior to actual operation. Low pressure air test at 5 psi or a water pressure test at 150 percent of normal operating pressure (minimum 10 psi) shall be conducted. The Engineer will be given 24 hours notice prior to testing.
- B. Inspection: During the time the Contractor is working at the project site, Contractor shall inspect the bypass pumping system every two (2) hours to ensure that the system is working correctly and shall keep a written log of the pump inspection results. Contractor shall inspect the bypass pumping system a minimum of either one (1) time per day or as often as necessary to ensure full fuel tanks for the bypass pumps.
- C. Maintenance Service: Contractor shall insure that the temporary pumping system is properly maintained and a responsible and competent mechanic/operator shall be on call at all times.

3.04 SEQUENCE OF CONSTRUCTION

- A. Contractor shall propose a Sequence of Construction incorporating all constraints detailed in this Section and shall secure concurrence of Owner prior to starting work.
- B. The Contractor shall submit a construction plan and schedule, which details the methods, means, techniques, and sequences to be used to establish a base element of surety against a wastewater spill, to the Engineer for review and approval by the Owner at least two (2) weeks prior to any connections to existing pipes or structures. Such plan shall provide

assurance against a wastewater spill, with at least one level of backup. Any and all fines or fees imposed upon the Owner resulting from spills or process interruptions shall be assessed solely upon Contractor. One week prior to connections being made to existing structures or pipes, a coordination meeting shall be held between the Contractor, Engineer, and Owner to discuss the construction plan previously submitted by the Contractor.

- C. Schedule of construction, interconnecting details, and other revisions necessary for proper interfacing of the Work are to be subsequently modified by Contractor accounting for results of said coordination meeting. The Engineer and Owner are to be notified 24 hours prior to any actual interruptions or connections being made. Begin no work prior to securing Owner's approval of respective connection plan and work schedule.

- END OF SECTION -

SECTION 02910

FINAL GRADING, SEEDING AND LANDSCAPING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all labor, equipment, and materials necessary for final grading, topsoiling, seeding, and miscellaneous site work not included under other Sections, but required to complete the work as shown on the Drawings and specified herein. Under this Section, all areas of the project site disturbed by excavation, materials storage, temporary roads, etc., shall be reseeded as specified herein.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Product Data
 - 2. Certification of all materials
 - 3. Three (3) copies vendor's statement for seed mixtures required, stating botanical and common name, place of origin, strain, percentage of purity, percentage of germination, and amount of pure live seed (PLS) per bag.

1.03 PROJECT CONDITIONS

- A. Verify amount of stockpiled topsoil and determine and provide additional topsoil as required.

PART 2 -- PRODUCTS

2.01 CONTRACTOR'S RESPONSIBILITIES

- A. Furnish and submit certification for the materials used as specified in the General Conditions, Division 1 and Division 2.

2.02 TOPSOIL

- A. Topsoil shall be defined as:
 - 1. Original top layer of surface soil typical of a project area.
 - 2. Existing stockpiled topsoil.
 - 3. Furnished topsoil capable of supporting native plant growth and free from noxious weed species.

- B. Upon completion and approval of the rough grading, the Contractor shall place the topsoil over all areas disturbed during construction under any contract except those areas which will be paved, graveled or rip rapped. Topsoil shall be finish graded to within 0.1 ft ± required elevations. Topsoil shall not be placed in a frozen or muddy condition and shall contain no toxic materials harmful to grass growth.

2.03 GRASS SEED

- A. The Contractor shall furnish the kinds and amounts of seed to be seeded in all areas disturbed by the construction work. All seed shall be labeled to show that it meets the requirements of the North Carolina Seed Law. All seed must have been tested within six (6) months immediately preceding the planting of such material on the job.
- B. The inoculant for treating legume seed shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container.
- C. The quality of the seed for non-native species used for soil stabilization shall conform to the following:

Type*	Minimum Seed Purity (%)	Minimum Germination (%)	Maximum Weed Seed (%)
Tall Fescue (<i>Schedonorus arundinaceus</i>)	98	90	1.00
Winter Rye Grain (<i>Secale cereale</i>)	98	85	0.10
Millet (<i>Urochloa ramosum</i> or <i>Setaria italica</i>)	98	85	0.50
Winter Wheat (<i>Triticum aestivum</i>)	98	85	0.10

*Exceptions shall be approved by the Owner and/or Engineer

- D. Seed containing prohibited noxious weed seed shall not be accepted. Seed shall be in conformance with N.C. Seed Law restrictions for restricted noxious weeds.
- E. No permanent seeding shall be performed from June 1 - August 31 and December 1 - January 31. Temporary Winter (TW) and Temporary Summer (TS) seed mixtures will be used during these times if seeding is necessary. Areas seeded with temporary seed mixtures shall be reseeded by the Contractor at no additional cost to the Owner with permanent seed as directed by the Engineer. Seed mixtures to be used on the project shall be as follows:

- P 20 lb/ac Native Seed Mixture (all areas except turfgrass and wetlands) – available as custom mixture from Ernst Conservation Seeds or approved equal:

Botanical Name	Common Name	%
<i>Schizachyrium scoparium</i>	Little Bluestem	25
<i>Elymus virginicus</i>	Virginia Wild Rye	20
<i>Sorghastrum nutans</i>	Indian Grass	20
<i>Panicum virgatum</i>	Switchgrass	15
<i>Chasmanthium latifolium</i>	Indian Woodoats	10
<i>Chamaecrista fasciculata</i>	Partridge Pea	8

<i>Asclepias syriaca</i>	Common Milkweed	1
<i>Eupatorium fistulosum</i>	Joe Pye Weed	1

Turfgrass Seed (lawn areas and road shoulders):
150 lb/ac Kentucky 31 Tall Fescue (Alta Tall Fescue) (fungus free)

Nurse Crop (separate application):
4/15-6/1 10 lb/ac German Millet or Browntop Millet
9/1-11/30 and 2/1-4/15 30 lb/ac Winter Wheat

- TW 12/1-1/31 120 lb/ac Winter Rye
- TS 6/1-8/31 40 lb/ac German Millet or Browntop Millet
- W 20 lb/ac Native Wetland Seed Mix (all disturbed wetland areas) – NC Piedmont FACW Mix – ERNMX – 308 available from Ernst Conservation Seeds or approved equal:

Botanical Name	Common Name	Percentage of Mix
<i>Carex vulpinoidea</i>	Fox Sedge	28
<i>Panicum anceps</i>	Beaked Panicgrass	20
<i>Elymus riparius</i>	Riverbank Wildrye	18
<i>Carex lurida</i>	Shallow Sedge	8
<i>Carex lupulina</i>	Hop Sedge	7
<i>Carex squarrosa</i>	Squarrose Sedge	5
<i>Juncus effusus</i>	Soft Rush	3
<i>Scirpus cyperinus</i>	Woolgrass	3
<i>Bidens aristosa</i>	Showy Tickseed Sunflower	2
<i>Hibiscus moscheutos</i>	Crimson-eyed Rosemallow	2
<i>Saururus cernuus</i>	Lizard's Tail	2
<i>Juncus tenuis</i>	Path Rush	1
<i>Vernonia noveboracensis</i>	New York Ironweed	1

Nurse Crop (separate application):
4/15-6/1 10 lb/ac German Millet or Browntop Millet
9/1-11/30 and 2/1-4/15 30 lb/ac Winter Wheat

- Note: P – Permanent Seeding
TW – Temporary Winter Seeding
TS – Temporary Summer Seeding
W – Wetland Seeding

- E. On cut and fill slopes 2:1 or steeper add 5 lb/ac of Weeping Lovegrass (*Eragrostis curvula*) and 5 lb/ac of Autumn Bentgrass (*Agrostis perennans*) to the P seed mixture.
- F. Quantities of seed, lime, fertilizer, mulch and top dressing shall be as indicated in Part 3.03 of this Section and in the seeding schedule on the drawings.
- G. Native Seed Mix and Native Wetland Seed Mix contain seed species with varying weights and densities. To help proportion the seed, filler can be used such as; sawdust, kitty litter, or

sand. Broadcast half the seed in direction (vertically) and the other half in the opposite direction (horizontally). Overseed with Nurse Crop in a separate application.

- H. Reseed according to optimum season for desired permanent vegetation. Where fescue is used to establish turfgrass, do not allow temporary cover to grow over twelve (12) inches in height before mowing, otherwise fescue may be shaded out.
- I. A Conservation Engineer or Soil Conservation Service shall be consulted for additional information concerning other alternatives for vegetation of denuded areas. The above vegetation rates are those which do well under local conditions; other seeding rate combinations are possible. Any variation from this list shall be pre-approved by the Owner/Engineer.

2.04 WATER

- A. Water for irrigation shall be furnished to the Contractor by the Owner from existing facilities as directed by the Engineer.
- B. The Contractor shall furnish all hoses and connections necessary to complete the landscaping work.

2.05 FERTILIZER

- A. Fertilizer shall be a complete commercial fertilizer with components derived from commercial sources. Fertilizer analysis shall be determined from field soil sampling in appropriate number taken by the Contractor and analyzed by the N.C. Department of Agriculture or other independent laboratory. Contractor shall furnish fertilizer in accordance with the recommendations of the N.C. Department of Agriculture.
- B. One-quarter of the Nitrogen shall be in the form of nitrates, one-quarter in the form of ammonia salts, and one-half in the form of natural organic Nitrogen. Available Phosphoric Acid shall be free from superphosphate, bone, or tankage. Potash shall be Sulphate of Potash. Elements shall conform to the standards of Association of Official Agricultural Chemists.
- C. Fertilizer shall be delivered in standard size bags marked with the weight, analysis of contents, and the name of the manufacturer. Fertilizer shall be stored in weatherproof storage areas and in such a manner that its effectiveness will not be impaired.

2.06 LIME

- A. At least 50% shall pass a No. 200 U.S.S. mesh sieve. At least 90% shall pass a No. 100 U.S.S. mesh sieve and 100% shall pass a No. 10 U.S.S. mesh sieve. Total carbonates shall not be less than 80% or 44.8% Calcium Oxide equivalent. For the purpose of calculation, total carbonates shall be considered as Calcium Carbonate.

2.07 WOOD CELLULOSE FIBER MULCH

- A. For use in hydroseeding grass seed in combination with fertilizers and other approved additions, shall consist of especially prepared wood cellulose fibers such as "Conwed", "Silva-Fiber", or equal, and have no growth or germination inhibiting factors, and be dyed green.

- B. The wood cellulose fiber shall have the additional characteristic of dispersing rapidly in water to form a homogeneous slurry and remain in such state when agitated in the hydraulic mulching unit, or adequate equal, with the specified materials.
- C. When applied, the wood cellulose fiber with additives will form an absorptive mat but not a plant inhibiting membrane, which will allow moisture, natural or mechanical, to percolate into underlying soil.
- D. The mulch shall be supplied, compressed in packages containing 50 pounds of material having an equilibrium air dry moisture content at time of manufacture of 12% plus or minus 2%. Wood cellulose fiber mulch shall be stored in a weatherproof storage area and in such a manner that effectiveness will not be impaired.

2.08 STRAW MULCH

- A. Straw used for mulch shall be small grain hay. Hay shall be undamaged, air dry, threshed straw, free of undesirable weed seed. Straw mulch is not required for seeded areas treated with a temporary soil stabilizer.

2.09 TEMPORARY SOIL STABILIZER

- A. The temporary agent for soil erosion control shall consist of an especially prepared highly concentrated powder which, when mixed with water, forms a thick liquid such as "Enviroseal 2001" by Enviroseal Corporation, "Terra Control" by Quattro Environmental, Inc., or "CHEM-CRETE ECO-110" by International CHEM-CRETE Corporation, and having no growth or germination inhibiting factors. The agent shall be used for hydroseeding grass seed in combination with other approved amendments resulting in a highly viscous slurry which, when sprayed directly on the soil, forms a gelatinous crust.

2.10 DITCH EROSION RETENTION BLANKET

- A. The blanket shall be as specified in Section 02276 - Erosion and Sedimentation Control.

2.11 RIPRAP AND HERBICIDES

- A. Furnish and install sufficient quantity of landscape gravel or riprap to cover over the ground to a minimum 4-inch depth for gravel and 24-inch depth for riprap, unless otherwise noted, or indicated on the Drawings. Also furnish and apply an approved herbicide to the subgrade surface just prior to installing the landscape gravel or riprap.
- B. During placing, the stone shall be graded so that the smaller stones are uniformly distributed through the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing where necessary or ordered by the Engineer. The placed riprap shall form a properly graded, dense, neat layer of stone.
- C. All topsoil and vegetative matter shall be removed from the subgrade surfaces prior to the application of the weed killer (herbicide) and to the placement of landscape gravel or riprap. Apply commercial-type herbicide as preemergence control of miscellaneous grasses and broadleaf weeds in granular or liquid form such as "Treflan", "Dymid", or equal. Methods and rates of application shall be in strict compliance to manufacturer's directions and acceptable to the Engineer.

- D. The herbicide selected shall be safe for use around ornamental plantings, have long-lasting weed control, and shall be resistant to leaching away under excessive rainfall.
- E. A second application of the herbicide shall be made on the surface of the landscape gravel or riprap sometime after the first six (6) months, but not later than 12-months. Same methods and rates apply as specified previously.

PART 3 -- EXECUTION

3.01 FINAL GRADING AND FINISHED GRADE ADJUSTMENTS

- A. All areas disturbed during the course of the work shall be brought to the original grade of the adjacent ground surfaces. The surface shall be graded smoothly with all stones and debris removed. The Contractor shall provide all labor and materials necessary to perform any adjustments in grade needed to obtain minimum cover.
- B. Excess fill material from the project excavation may be used for grade adjustments provided that it is free of rocks (over 2-inches in diameter), roots or other objectionable materials. The fill material shall be spread evenly and properly compacted.
- C. Final surface grading of the topsoiled, landscape graveled, and ripped areas shall be mechanically raked or hand raked to an even finished surface alignment.

3.02 TOPSOIL

- A. Topsoil shall be spread in place for quantity required for lawn and road shoulder seed areas at 4-inch consolidated depth, and sufficient quantity for certain plant beds and backfill for shrubs and trees as specified. Topsoil shall be required for all grass areas disturbed inside fenced parking lots.

3.03 SEEDBED PREPARATION

- A. Chisel compacted areas and spread topsoil four (4) inches deep over adverse soil conditions, with stockpiled topsoil. Contractor shall reserve sufficient topsoil for seedbed preparation.
- B. Rip the entire area to six (6) inch depth.
- C. Topsoil shall be placed in areas to be seeded and roughened with tracked equipment or other suitable measures. Slopes steeper than 3:1 may be roughened by grooving, furrowing, tracking, or stairstep grading. Slopes flatter than 3:1 should be grooved by disking, harrowing, raking, or operating planting equipment on the contour.
- D. Remove all loose rock, roots, and other obstructions leaving surface reasonably smooth and uniform.
- E. Apply agricultural lime and fertilizer uniformly and mix with soil in accordance with the following table.

Application Rates in Pounds per Acre							
Seed Mixture	Planting Season	Lime*	Seed	Fertilizer	Straw Mulch	Top Dressing	Comments
P	Feb 15 – Apr 30 & Sep 1 – Oct 31	4000	120	500	4000	500 of 10-10-10 and 60 of Nitrogen	Preferred planting seasons are Sep 11 – Sep 30 & Feb 15 – Mar 30
TW	Jan 1 – May 1	2000	120/50	750	4000	N/A	Overseed with Type P seed mixture during next planting season
TS	May 1 - Aug 15	2000	35	750	4000	N/A	Overseed with Type P seed mixture during next planting season
TF	Aug 16 – Dec 30	2000	120	1000	4000	N/A	Overseed with Type P seed mixture during next planting season

- F. Continue tillage until a well-pulverized, firm, reasonably uniform seedbed is prepared 4 to 6 inches deep.
- G. Seed on a freshly prepared seedbed and cover seed lightly with seeding equipment or cultipacker after seeding.
- H. Mulch immediately after seeding and anchor mulch by rolling thoroughly in several directions with a crimper roller or by applying a starch-based tackifier such as StarTak 600 manufactured by Chemstar or approved equal in accordance with manufacturers instructions.
- I. Inspect all seeded areas and make necessary repairs or reseeding within the planting season, if possible. If stand is less than 60% established, the entire area shall be reseeded according to specifications using the original lime, fertilizer and seeding rates.
- J. Consult a Conservation Inspector on maintenance treatment and fertilization after permanent cover is established.

3.04 HYDROSEEDING AND GRASS (OPTIONAL METHOD)

- A. The Contractor shall grow a stand of grass by hydroseeding method on all disturbed areas. The Contractor shall be responsible for the satisfactory growth of grass throughout the period of the one-year guarantee.
- B. The Contractor's work shall include the preparation of the topsoil and bare soil seed bed, application of fertilizer, limestone, mulching, inoculant, temporary soil stabilizer, watering, and all other operations necessary to provide a satisfactory growth of sod at the end of the one-year maintenance period. Areas without satisfactory sod at the end of one (1) year shall be replanted until satisfactory growth is obtained and acceptable to the Engineer.
- C. All areas to be seeded shall be done by the hydraulic seeding method including all additives and amendments required. A "Reinco", "Finn", or "Bowie" type hydromulcher with adjustable nozzles and extension hoses, or equal, shall be utilized. General capacity of tank should range from 500 to 2,500 gallons, or as approved by the Engineer.
- D. Hydraulic seeding shall be carried out in three steps. Step one shall consist of the application of lime. In step two the seed mixture shall be mixed with the fertilizer, wood cellulose fiber mulch, and any required inoculants and applied to the seed bed. Step three shall consist of application of top dressing during the first spring or fall, whichever comes first, after step two.
- E. Top dressing shall consist of a commercial grade fertilizer plus Nitrogen or other analysis as may be recommended by soil testing. Types and application rates of seed mixtures, lime, fertilizer, and wood cellulose fiber mulch, shall be as shown in the Seeding Schedule.
- F. Ingredients for the mixture and steps should be dumped into a tank of water and thoroughly mixed to a homogeneous slurry and sprayed out under a minimum of 300-350 pounds pressure, in suitable proportions to accommodate the type and capacity of the hydraulic machine to be used. Applications shall be evenly sprayed over the ground surface. The Contractor shall free the topsoil of stones, roots, rubbish, and other deleterious materials and dispose of same off the site. The bare soil, except existing steep embankment area, shall be rough raked to remove stones, roots, and rubbish over 4-inches in size, and other deleterious materials and dispose of same off the site.
- G. No seeding should be undertaken in windy or unfavorable weather, when the ground is too wet to rake easily, when it is in a frozen condition, or too dry. Any bare spots shown in two to three weeks shall be recultivated, fertilized at half the rate, raked, seeded, and mulched again by mechanical or hand broadcast method acceptable to the Engineer.
- H. Areas that have been seeded with a temporary seed mixture shall be mowed to a height of less than 2-inches and scarified prior to seeding with the permanent seed mixture.
- I. The Contractor shall provide, at his own expense, protection for all seeded areas against trespassing and damage at all times until acceptance of the work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.
- J. The Contractor shall water newly seeded turfgrass areas once a week until the grasses have germinated sufficiently to produce a healthy turf, or unless otherwise directed by the Engineer. Each watering shall provide three (3) gallons per square yard. The Contractor shall furnish all necessary hoses, sprinklers, and connections.

- K. The first and second cutting of the turfgrasses only shall be done by the Contractor. All subsequent cuttings will be done by the Owner's forces in a manner specified by the Contractor.

3.05 DITCH AND SWALE EROSION PROTECTION

- A. All ditches and swales indicated on the Drawings shall be lined with an erosion control blanket of single width. The area to be covered shall be properly graded and hydroseeded before the blanket is applied. Installation shall be in accordance with Section 02276, Erosion and Sedimentation Control.
- B. Special attention should be given to maintaining ditches/culverts at existing driveway/cross drainage.

3.06 MAINTENANCE

- A. The Contractor shall be responsible for maintaining all seeded areas through the end of his warranty period. Maintenance shall include but not be limited to, annual fertilization, mowing, repair of seeded areas, irrigation, and weed control. The Contractor shall provide, at his own expense, protection for all seeded areas against trespassing and damage at all times until acceptance of the work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.
- B. Annual fertilization shall consist of an application of 500 lb/ac of 10-10-10 commercial grade fertilizer, or its equivalent and 60 lb/ac of nitrogen in early fall, or other analysis as may be determined by soil test. Annual fertilization shall be in addition to top dressing and shall be performed by the Contractor each fall season after planting until the work is substantially complete.
- C. Mowing shall be scheduled so as to maintain a minimum stand height of 2-inches or as directed by the Engineer.
- D. All seeded areas shall be inspected on a regular basis and any necessary repairs or reseedings made within the planting season, if possible. If the stand should be over 60% damaged, it shall be re-established following the original seeding recommendations.
- E. Weed growth shall be maintained mechanically and/or with herbicides. When chemicals are used, the Contractor shall follow the current North Carolina Agricultural Experiment Stations' weed control recommendations and adhere strictly to the instructions on the label of the herbicide. No herbicide shall be used without prior approval of the Engineer.
- F. Special attention shall be given to lawns, lawn-type areas, to establish a smooth, uniform stand of grass, free of weeds, stones, or eroded/bare areas.

3.07 CLEANUP

- A. The Contractor shall remove from the site all subsoil excavated from his work and all other debris including, but not limited to, branches, paper, and rubbish in all landscape areas, and remove temporary barricades as the work proceeds.
- B. All areas shall be kept in a neat, orderly condition at all times. Prior to final acceptance, the Contractor shall clean up the entire landscaped area to the satisfaction of the Engineer.

3.08 REMOVAL OF TEMPORARY SEDIMENTATION CONTROL

- A. After completion of project and a permanent stand of grass has been established and approvals obtained from regulatory agencies, the Contractor shall remove all temporary erosion control measures, such as but not limited to silt fences, stabilized outlets, stone filters, check dams, construction entrances, etc., and restore the surfaces as required in this section.

- END OF SECTION -

SECTION 02960

TRAFFIC CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall obey all traffic laws and comply with all the requirements, rules, and regulations of the North Carolina Department of Transportation and local authorities having jurisdiction and to maintain adequate warning signal lights, barriers, etc., for the protection of traffic on public roadways. To the extent traffic control measures are shown on the drawings, they are minimum requirements, and additional measures should be anticipated and provided by the Contractor.
- B. The Contractor shall maintain traffic and protect the public from all damage to persons and property within the Contract limits, in accordance with the Contract Documents and all applicable State and local regulations. He shall conduct his operations so as to maintain and protect access, for vehicular and pedestrian traffic, to and from all properties adjoining or adjacent to those streets affected by his operations, and to subject the public to a minimum of delay and inconvenience. Suitable signs, barricades, railings, etc., shall be erected and the work outlined by adequate lighting at night. Danger lights shall be provided as required. Watchmen and flagmen shall be provided as may be necessary for the protection of traffic.
- C. Warning signs shall be provided along all highways while work is in progress; and where traffic direction is required, flagmen shall be designated by the Contractor to direct traffic past the equipment, machinery, or construction operations. Barricades and lights shall be provided as required to protect traffic. Where trenches have been cut in road shoulders on which traffic may pass at times, red flags and warning signs shall be placed at frequent intervals and maintained until the shoulder is safe for travel. The traveling public shall be warned of the construction with signing that is in accordance with the latest edition of the Manual on Uniform Traffic Control Devices.
- D. All signs and traffic control devices shall meet the minimum requirements of the latest edition of the Manual on Uniform Traffic Control Devices.
- E. During the progress of the work, driveways, sidewalks, and crossings of highways and streets shall be kept open for the passage of pedestrians and traffic and shall not be unnecessarily obstructed unless authorized by the authority having jurisdiction over the same.
- F. The Contractor shall take such measures, at his own expense, as may be necessary to keep the streets open for traffic and shall give advance notice to the local Fire and Police Departments of his proposed street operations by calling 911, at the beginning and end of each working day.
- G. The Contractor shall, in writing, give residents 48-72 hours advance notice of his proposed street operations to allow residents to make other arrangements for driveway and street

parking and access to driveways. The Contractor shall also give at least 24 hours advance notice to the Police Department for parking spaces required to be removed for construction purposes.

- H. The Contractor shall notify the North Carolina Department of Transportation at least five (5) working days in advance of work on Highway Rights-of-Way, and shall fully cooperate with the Department.
- I. The Contractor shall construct and maintain, without extra compensation, such adequate and proper bridges over excavations as may be necessary or directed for the purpose of accommodating pedestrians or vehicles.
- J. All temporary means constructed by the Contractor shall be removed upon completion of work unless otherwise specified by the Engineer and any damage done to public or private property shall be made good by the Contractor.
- K. All dirt spilled from the Contractor's trucks on existing pavements over which it is hauled or which has otherwise been deposited thereon shall be removed by the Contractor whenever in the opinion of the Engineer, North Carolina Department of Transportation or the local authorities having jurisdiction, the accumulation is sufficient to cause the formation of mud, dust, interference with traffic, or create a traffic hazard.

1.02 STREET SIGNS AND MARKERS AND ROUTE MARKERS

- A. The Contractor shall move any existing street signs and markers and route markers out of the construction limits of the project and install the street signs and markers and route markers so that they will be visible to the traveling public if there is sufficient right of way for these signs and markers outside of the construction limits.
- B. Near the completion of the project and when so directed by the Engineer, the Contractor shall move the signs and markers and install them in their proper location in regard to the finished pavement of the project.
- C. Any signs or markers which cannot be relocated due to lack of right-of-way, or any signs and markers which will no longer be applicable after the construction of the project, shall be stockpiled at locations directed by the Engineer for removal by others.
- D. The Contractor will be responsible to the Owner for any damage to any street signs and markers or route markers during the above described operations.
- E. No direct payment will be made for relocating, reinstalling, and/or stockpiling the street signs and markers and route markers as such work will be considered incidental.

PART 2 -- MATERIALS

2.01 CONSTRUCTION TRAFFIC CONTROL DEVICES

- A. Description - The work covered by this Section consists of furnishing, erecting, maintaining, relocating, and removing traffic control devices in accordance with the Drawings, Specifications, MUTCD, or as directed by the Engineer. The MUTCD referred to in this

provision shall be the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as prepared by the National Advisory Committee on Uniform Traffic Control Devices, including all standard documents referred to in the second paragraph of Section 1A-7 of the MUTCD. The current edition shall be the edition current on the date of advertisement for the Project. All traffic control devices furnished by the Contractor shall remain the property of the Contractor, unless otherwise required by the Contract. Traffic control devices shall include, but not be limited to signs, non-metallic drums, barricades, cones, delineators, temporary guardrail, temporary pavement marking, raised reflective pavement markers, flaggers and pilot vehicles, as required.

- B. Materials - General - Unless otherwise required, materials used in the fabrication and installation of construction traffic control devices shall be in accordance with the applicable provision of the MUTCD. When traffic control devices are no longer required for traffic handling in the initial phase of construction requiring their use, they may be reused at various locations throughout the project provided the device is not defaced, is structurally sound, clean, and otherwise conforms to the above requirements.
- C. Traffic control devices which do not meet the requirements of this Section shall not be used; and, when during the life of a project, a device ceases to meet the requirements of this Section it shall be promptly removed and replaced with a conforming device at no additional compensation. The Engineer shall have the authority to determine the acceptability of the traffic control devices.
- D. Construction Methods - General - Traffic control devices shall be installed at the inception of construction operations, and shall be properly maintained, relocated as necessary, cleaned, and operated during the time they are in use. They shall remain in place only as long as they are needed and shall be immediately removed thereafter. Where operations are performed in stages, only those devices that apply to the conditions present shall be left in place.
- E. The location, legends, sheeting, dimensions, number of supports, and horizontal and vertical placement of warning signs, barricades, and other traffic control devices shall be as required by the Drawings or the MUTCD or as directed by the Engineer. The Contractor may submit for the Engineer's consideration a method for handling traffic other than as shown on the Drawings. The alternate traffic handling plans shall not be used until they are approved by the Engineer in writing. During periods when not warranted, warning signs and other devices shall be removed from the work area, covered with specified material, or otherwise positioned so they do not convey their message to the traveling public. If covered, the covering material shall be exterior plywood and shall cover the entire face of the sign panel. The covering material shall be installed in such a manner that the sign panel will not be defaced. Covering material shall be maintained in a neat and workmanlike manner during its use.
- F. Weeds, brush, trees, construction materials, equipment, etc., shall not be allowed to obscure any traffic control device in use.
- G. If cones are used for delineation at night, each cone shall have any appropriate white reflectorized cone collar as detailed on the Drawings, or as directed by the Engineer.

- H. Competent and properly trained flaggers, properly attired and equipped, shall be provided as shown on the Drawings, when directed by the Engineer, or when the Contractor deems it necessary to safely handle traffic through the construction area.
- I. The Contractor shall assume full responsibility for the continuous and expeditious maintenance of all construction warning signs, barricades, and other traffic control devices. Maintenance shall include repair and replacement of traffic control devices which, in the opinion of the Engineer, are damaged by traffic or other means, or deteriorated beyond effectiveness. Conditions covered under maintenance shall include but not be limited to replacement due to loss of reflectivity; replacement of broken supports; plumbing of leaning signs; cleaning of dirty signs, barricades, and other devices; repair of defaced sheeting and legend; and replacement of stolen or vandalized items. All items used for traffic control shall be maintained in a satisfactory condition. Failure to maintain all traffic control devices in a satisfactory condition may be cause for suspension of construction operations until proper traffic control is re-established.
- J. The Contractor shall continuously review and maintain all traffic handling measures to assure that adequate provisions have been made for the safety of the public and workers.

2.02 STATIONARY CONSTRUCTION SIGNS

- A. Description - The work covered by this Section consists of furnishing, erecting, relocating, maintaining, and removing stationary signs necessary for controlling traffic.
- B. Materials - Reflective sheeting shall be used on all sign facing and shall meet the requirements of AASHTO M268. The reflective sheeting shall be enclosed lens (Engineers grade) sheeting and shall have a smooth, sealed outer surface which will display the same color both day and night. The reflective sheeting on each sign shall have a smooth appearance. The reflective sheeting shall be applied in a workmanlike manner so that there are no bubbles or wrinkles in the material.
 - 1. The Contractor shall furnish a material certification in accordance with Article 106-3 of the NCDOT Standard Specifications for all new and used reflective sheeting as required by the Engineer.
- C. Construction Methods - All work shall be in accordance with requirements of Section 2.01.

2.03 TYPE III BARRICADES

- A. Description - The work covered by this Section consists of furnishing, erecting, maintaining, and removing Type III Barricades.
- B. Construction Methods - All work shall be in accordance with requirements of Section 2.01.

2.04 PORTABLE TEMPORARY TRAFFIC CONTROL DEVICES

- A. Description - The work covered by this Section consists of furnishing erecting, relocating, maintaining, and removing portable temporary traffic control devices necessary for controlling traffic. Portable temporary traffic control devices shall include but not be limited to portable signs, non-metallic drums, barricades, cones, delineators, flaggers, pilot

vehicles, and any other traffic control device not covered by any other Sections included in this Contract.

- B. Portable Signs - Reflective sheeting shall be used on all sign facing and shall meet the requirement of AASHTO M268. The reflective sheeting shall be enclosed lens (Engineers grade) sheeting and shall have a smooth, sealed outer surface which will display the same color both day and night. The reflective sheeting on each sign shall have a smooth appearance. The reflective sheeting shall be applied in a workmanlike manner so that there are no bubbles or wrinkles in the material.
1. The Contractor shall furnish a material certification in accordance with Article 106-3 of the NCDOT Standard Specifications for all new and used reflective sheeting as required by the Engineer.
- C. Non-Metallic Drums - The drums shall be made of plastic impact resistant material. The drums shall have a two-piece, breakaway design that will maintain its integrity upon impact throughout a temperature range of -20°F to 125°F . Upon impact the upper portion of the drum shall deform and breakaway from the base, minimizing damage to drums or vehicles. The base and ballast shall remain in position and vehicle shall easily pass over it.
1. The drums shall be designed to have two TYPE "A" or "C" light wells located on the top surface of the drums. The drums shall be designed with a top to completely seal the drums to prevent water from accumulating and freezing in the bottom of the drums. The base shall be designed to accommodate a sandbag of 40 lbs. to 60 lbs. A sandbag with 50 lbs. of sand shall be supplied with each drum.
 2. The drums shall have an assembled minimum height of 36", a minimum outside base diameter of 21", and a combined minimum weight of 12 lbs.
 3. The Contractor shall be required to furnish the Engineer a sample drum and its specifications for approval prior to the delivery of drums of the project.
 4. The markings on drums shall be horizontal, circumferential, orange and white stripes six to eight inches wide, covering entire outside. The entire area of orange and white shall be reflectorized with the enclosed lens (Engineers grade) sheeting, except for the corrugation area where a 2" non-reflectorized band will be allowed. There shall be at least two orange and two white stripes on each drum. Reflectorized material shall have a smooth, sealed outer surface which will display the same approximate color day and night. The reflective sheeting shall meet the requirement of AASHTO M268.
- D. Construction Methods - All work shall be in accordance with the requirements of Section 2.01.

2.05 FLASHING ARROW PANELS

- A. Description - The work covered by this Section consists of furnishing, maintaining, moving, and relocating flashing arrow panels mounted on a trailer, truck, or other mobile unit, as shown on the Contract Drawings.

- B. Materials - The flashing arrow panels shall meet the requirements of the MUTCD (Section 6E) for a Type A panel.
- C. Construction Methods - All work shall be in accordance with the requirements of Section 2.01.
- D. During periods of times that traffic is shifted from its normal pattern, a mobile flashing arrow panel shall be used at locations shown on the Drawings or at locations directed by the Engineer.

PART 3 -- EXECUTION

- 3.01 All traffic control devices to be installed in accordance with the approved plan and the agency having jurisdiction.

- END OF SECTION -

SECTION 03100

CONCRETE FORMWORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03200 - Reinforcing Steel
- B. Section 03290 - Joints in Concrete
- C. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

- 1. North Carolina Building Code
- 2. ACI 318 - Building Code Requirements for Structural Concrete
- 3. ACI 301 - Specifications for Structural Concrete for Buildings
- 4. ACI 347 - Recommended Practice for Concrete Formwork
- 5. U.S. Product Standard for Concrete Forms, Class I, PS 1
- 6. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Manufacturer's data on proposed form release agent
 - 2. Manufacturer's data on proposed formwork system including form ties

1.05 QUALITY ASSURANCE

- A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 -- PRODUCTS

2.01 FORMS AND FALSEWORK

- A. All forms shall be smooth surface forms unless otherwise specified.
- B. Wood materials for concrete forms and falsework shall conform to the following requirements:
 - 1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.
 - 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.
- C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

- A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.
- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Greenstreak Group, Inc., or approved equal. Friction fit plugs shall not be used.
- C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 -- EXECUTION

3.01 FORM DESIGN

- A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.
- B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.
- C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

- A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.
- B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.
- C. Forms shall be true to line and grade, and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.
- D. Forms shall be mortar tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form.
- E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

- F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.
- G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.
- H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.
- I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.
- J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
- K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

- A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.
- B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.
- C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and bench marks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be

used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

- D. Regardless of the tolerances specified, no portion of the building shall extend beyond the legal boundary of the building.

3.04 FORM ACCESSORIES

- A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.
- B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to water or enclosed surfaces above the water surface, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified in Section 03350 - Concrete Finishing. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION - FORM RELEASE AGENT

- A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

- A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

- A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

- A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.
- B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

Ambient Temperature (°F.) During Concrete Placement

	<u>Over 95°</u>	<u>70°-95°</u>	<u>60°-70°</u>	<u>50°-60°</u>	<u>Below 50°</u>
Walls	5 days	2 days	2 days	3 days	Do not remove until directed by Engineer (7 days minimum)
Columns	7 days	2 days	3 days	4 days	
Beam Soffits	10 days	7 days	7 days	7 days	
Elevated Slabs	12 days	7 days	7 days	7 days	

- C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.
- D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall be available for inspection at all times at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

- A. When reshoring is permitted or required the operations shall be planned in advance and subjected to approval by the Engineer.
- B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.
- C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.
- D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores

shall be located directly under a reshore position above unless other locations are permitted.

- E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

- END OF SECTION -

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SECTION 03200
REINFORCING STEEL

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

- A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.
- B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork
- B. Section 03300 - Cast-in-Place Concrete
- C. Section 03400 - Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

- 1. North Carolina Building Code
- 2. CRSI - Concrete Reinforcing Institute Manual of Standard Practice
- 3. ACI SP66 - ACI Detailing Manual
- 4. ACI 315 - Details and Detailing of Concrete Reinforcing
- 5. ACI 318 - Building Code Requirements for Structural Concrete
- 6. WRI - Manual of Standard Practice for Welded Wire Fabric
- 7. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing
- 8. ASTM A 1064 - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.
2. Mill test certificates - 3 copies of each.
3. Description of the reinforcing steel manufacturer's marking pattern.
4. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
5. Proposed supports for each type of reinforcing.
6. Request to use splices not shown on the Drawings.
7. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.
8. Request for placement of column dowels without the use of templates.
9. Request and procedure to field bend or straighten partially embedded reinforcing.
10. Certification that all installers of dowel adhesive are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.

1.05 QUALITY ASSURANCE

- A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.
- B. Installer Qualifications for Drilled-In Rebar: Drilled-in rebar shall be installed by an Installer with at least three years of experience performing similar installations. Installer shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.
- C. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the Installer on the project. Training shall consist of a review of the complete installation process for drilled-in anchors, to include but not be limited to the following:
 1. Hole drilling procedure.
 2. Hole preparation and cleaning technique.
 3. Adhesive injection technique and dispenser training/maintenance.
 4. Rebar doweling preparation and installation.

5. Proof loading/torquing.

PART 2 -- PRODUCTS

2.01 REINFORCING STEEL

- A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.
- B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings.
- C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.
- D. Field welding of reinforcing steel will not be allowed.
- E. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

- A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Slab bolsters shall have gray plastic-coated legs.
- B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

- A. Mechanical couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcing bars being spliced at each splice. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.
- B. Hot-forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

2.04 DOWEL ADHESIVE SYSTEM

- A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and reinforcing bar. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar, unless noted otherwise on the Drawings. The adhesive system shall be "Epcon System G5" as manufactured by ITW Redhead, " HIT-HY 200 Injection Adhesive Anchor System" as manufactured by Hilti, Inc. "SET-XP" as manufactured by Simpson Strong-Tie Co. or "PE-1000+" by Powers Fasteners. Engineer's approval is required for use of this system in locations other than those shown on the Drawings. **Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved by Engineer and Owner.**

- B. Where identified on the Contract Drawings or for installation of concrete where anchorage failure could present a life-threatening hazard, the adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories, must comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. The adhesive system shall be "HIT-HY 200 Injection Adhesive Anchoring System" as manufactured by Hilti, Inc. "PE-1000 SD" by Powers Fasteners, "SET-XP" by Simpson Strong-Tie Co. or "Epcon System G5" as manufactured by ITW Redhead. Installation of adhesive system shall be in accordance with manufacturer's recommendations and as required in Item A above. **Alternate adhesive system shall not be acceptable.**

- C. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

PART 3 -- EXECUTION

3.01 TEMPERATURE REINFORCING

- A. Unless otherwise shown on the Drawings or in the absence of the concrete reinforcing being shown, the minimum cross sectional area of horizontal and vertical concrete reinforcing in walls shall be 0.0033 times the gross concrete area and the minimum cross sectional area of reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

3.02 FABRICATION

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.
- C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved by the Engineer to be bent in the field. Reinforcing bars shall not be straightened or rebent in a manner that will injure the material. Heating of bars will not be permitted.
- D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3.03 DELIVERY, STORAGE AND HANDLING

- A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.
- B. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.
- C. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and if necessary recleaned.

3.04 PLACING

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.
- B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

- D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.
- E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.
- F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.
- G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.
- H. Reinforcing shall not be straightened or rebent unless specifically shown on the drawings or authorized in writing by the Engineer. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.
- I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's recommendations and as required in Article 2.04.A. above. A representative of the manufacturer must be on site when required by the Engineer. Testing of adhesive dowels shall be as indicated below and if the dowels are required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.
- J. Adhesive Dowel Testing
 - 1. At all locations where adhesive dowel testing is shown on the Drawings, at least 25 percent of all adhesive dowels installed shall be tested to the value indicated on the Drawings, with a minimum of one tested dowel per group. If no test value is indicated on the Drawings but the installed dowel is under direct tension, the Contractor shall notify the Engineer to verify whether anchor load testing is required.
 - 2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. The testing equipment shall have a minimum of three support points and shall be of sufficient size to locate the edge of supports no closer than two times the anchor embedment depth from the center of the anchor.
 - 3. Where Contract Documents indicate adhesive dowel design to be the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State of North Carolina. The Contractor's Engineer shall also submit documentation indicating that the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable.
 - 4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the dowel after loading shall be considered a failure. Dowels exhibiting damage shall be removed and

replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be proof tested.

3.05 SPLICING

- A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.
- B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.
- C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer.
- E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.06 INSPECTION

- A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.
- B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.07 CUTTING OF EMBEDDED REBAR

- A. The Contractor shall not cut embedded rebar cast into structural concrete without prior approval of the Engineer.

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SECTION 03290

JOINTS IN CONCRETE

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

- A. Provide all materials, labor and equipment required for the construction of all joints in concrete specified herein and shown on the Drawings.
- B. Types of joints in concrete shall be as follows:
 - 1. Construction Joints - Joints between adjacent concrete placements continuously connected with reinforcement.
 - 2. Expansion Joints - Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.
 - 3. Contraction Joints - Joints formed in concrete to provide a weakened plane in concrete section to control formation of shrinkage cracks.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork
- B. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. ACI 301 - Specifications for Structural Concrete for Buildings
 - 2. ACI 318 - Building Code Requirements for Structural Concrete
 - 3. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
 - 4. ACI 224.3 – Joints in Concrete Construction

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 - 1. Layout drawings showing location and type of all joints to be placed in each structure.

2. Details of proposed joints in each structure.
3. For sawcut contraction joints submit documentation indicating the following:
 - a. Proposed method of sawcutting indicating early entry or conventional sawing.
 - b. Description of how work is to be performed including equipment to be utilized, size of crew performing the work and curing methods.
 - c. Description of alternate method in case of time constraint issues or failure of equipment.

PART 2 -- MATERIALS

2.01 MATERIALS

- A. All materials required for joint construction shall comply with Section 03250 - Concrete Accessories, and Section 07900 - Joint Fillers, Sealants and Caulking.

PART 3 -- EXECUTION

3.01 CONSTRUCTION JOINTS

- A. Construction joints shall be as shown on the Drawings. Otherwise, Contractor shall submit description of the joint and its location to Engineer for approval.
- B. Unless noted otherwise on the Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.
- C. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0". For exposed walls with fluid or earth on the opposite side, the spacing between vertical and horizontal joints shall be a maximum of 25'-0".
- D. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.
- E. All reinforcing steel and welded wire fabric shall be continued across construction joints. Keys and inclined dowels shall be provided as shown on the Drawings or as directed by the Engineer. Longitudinal keys shall be provided in all joints in walls and between walls and slabs or footings, except as specifically noted otherwise on the Drawings. Size of keys shall be as shown on the Drawings.
- F. All joints in water bearing structures shall have a waterstop. All joints below grade in walls or slabs which enclose an accessible area shall have a waterstop.

3.02 EXPANSION JOINTS

- A. Size and location of expansion joints shall be as shown on the Drawings.
- B. All expansion joints in water-bearing structures shall have a center-bulb type waterstop. All expansion joints below grade in walls or slabs which enclose an accessible area shall have a center-bulb type waterstop. Waterstop shall be as shown on Drawings and specified in Section 03250, Concrete Accessories.

3.03 CONTRACTION JOINTS

- A. Location of contraction joints shall be as shown on the Drawings.
- B. Contraction joints shall be formed either by sawcutting or with contraction joint inserts as specified in Section 03250, Concrete Accessories. Sawcutting of joints will not be permitted unless specifically approved by the Engineer.
- C. If approved by the Engineer, sawcutting of contraction joints in lieu of forming shall conform to the following requirements:
 - 1. Joints shall be sawed as soon as the concrete can support foot traffic without leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.
 - 2. Curing shall be performed using wet curing methods as indicated in Section 03370 – Concrete Curing. Curing mats, fabrics or sheeting materials shall remain in place to the extent possible while cutting of joint is being performed. Curing materials shall only be removed as required and shall be immediately reinstalled once cutting of the joint has been completed.
 - 3. Depth of joint shall be as shown on the drawings or noted in these specifications. At locations where the joint cannot be installed to full depth due to curbs or other stopping points hand tools shall be used to complete joints.
 - 4. Saw cut joints shall meet the requirements of ACI 224.3, Section 2.8, Jointing Practice.
- D. Unless noted otherwise on Drawings, depth of contraction joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

3.04 JOINT PREPARATION

- A. No concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
- B. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.
- C. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining

surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

- D. All joints shall be sealed as shown on the Drawings and specified in Section 03250, Concrete Accessories.

- END OF SECTION -

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.
- B. The requirements in this section shall apply to the following types of concrete:
 - 1. Class A1 Concrete: Normal weight structural concrete
 - 2. Class B Concrete: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, concrete fill, and other areas where specifically noted on Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 - Concrete Formwork
- B. Section 03200 - Reinforcing Steel
- C. Section 03290 - Joints in Concrete
- D. Section 03370 - Concrete Curing
- E. Section 03600 - Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. North Carolina Building Code
 - 2. ACI 214 Guide to Evaluation of Strength Test Results of Concrete
 - 3. ACI 301 Specifications for Structural Concrete
 - 4. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 5. ACI 305 Guide to Hot Weather Concreting

6. ACI 306 Guide to Cold Weather Concreting
7. ACI 309 Guide for Consolidation of Concrete
8. ACI 318 Building Code Requirements for Structural Concrete and Comentary
9. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
10. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
11. ASTM C 33 Standard Specification for Concrete Aggregates
12. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
13. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
14. ASTM C 88 Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
15. ASTM C 94 Standard Specification for Ready-Mixed Concrete
16. ASTM C 114 Standard Test Method for Chemical Analysis of Hydraulic Cement
17. ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
18. ASTM C 138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
19. ASTM C 143 Standard Test Method for Slump of Hydraulic Cement Concrete
20. ASTM C 150 Standard Specification for Portland Cement
21. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete
22. ASTM C 192 Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
23. ASTM C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
24. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete
25. ASTM C 295 Standard Guide for Petrographic Examination of Aggregates for Concrete

26. ASTM C 457 Standard Test Method for Microscopical Determination of the Air-Void System in Hardened Concrete
27. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete
28. ASTM C 595 Standard Specification for Blended Hydraulic Cements
29. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
30. ASTM C 989 Standard Specification for Slag Cement for Use in Concrete and Mortars
31. ASTM C 1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
32. ASTM C 1260 Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)
33. ASTM C 1567 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
34. ASTM C 1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
35. ASTM C 1778 Reducing the Risk of Deleterious Alkali – Aggregate Reaction in Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Sources of all materials and certifications of compliance with specifications for all materials.
2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used.
3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.
4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, potential reactivity, aggregate soundness tests, petrographic analysis, mortar bar expansion testing, etc.
5. Manufacturer's data on all admixtures stating compliance with required standards.
6. Concrete mix design for each class of concrete specified herein.

7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.

1.05 QUALITY ASSURANCE

- A. Tests on materials used in the production of concrete shall be required as specified in PART 2 -- PRODUCTS. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.
- B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.
- C. Field quality control tests, as specified in Article 3.10, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.

PART 2 -- PRODUCTS

2.01 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C 150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.02 or 2.03 respectively.
2. When potentially reactive aggregates as defined in Article 2.05 are to be used in concrete mix, cement shall meet the following requirements:
 - a. For concrete mixed with only Portland Cement, the total alkalis in the cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.40%.
 - b. For concrete mixed with Portland Cement and an appropriate amount of fly ash (Article 2.02) or slag cement (Article 2.03) the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%.
3. When non-reactive aggregates as defined in Article 2.05 are used in concrete mix, total alkalis in the cement shall not exceed 1.0%.
4. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.
 2. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.
 3. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.
 4. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 and 2.03, respectively.
 5. When reactive aggregates as defined in Article 2.05 are used in concrete mix, the total alkalis in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%. The percentage of fly ash or slag cement shall be set to meet provisions of Article 2.05.G.3.
- C. Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.
- D. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.02 FLY ASH

- A. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.
- B. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.
- C. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash. The percentage of fly ash shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.
- D. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.03 SLAG CEMENT

- A. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.
- B. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag. The percentage of slag cement shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.
- C. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.
- D. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

2.04 WATER

- A. Water used for mixing concrete shall be clear, potable and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts and other impurities.
- B. Water shall not contain more than 100 PPM chloride.
- C. Water shall not contain more than 500 PPM dissolved solids.
- D. Water shall have a pH in the range of 4.5 to 8.5.
- E. Water shall meet requirements of ASTM C 1602.

2.05 AGGREGATES

- A. All aggregates used in normal weight concrete shall conform to ASTM C 33.
- B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33.
- C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.
- D. For Class A4 concrete, coarse aggregate shall be Size #8 in accordance with ASTM C33.
- E. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.
- F. Aggregates shall be tested for soundness in accordance with ASTM C 88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.
- G. All aggregates shall be evaluated in accordance with ASTM C 1778 to determine potential reactivity. All aggregates shall be considered reactive unless they meet the requirements below for non-reactive aggregates. Aggregates with a lithology essentially similar to

sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests above.

1. Non-reactive aggregates shall meet the following requirements:

A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:

- (a) Optically strained, microfractured, or microcrystalline quartz, 5.0%, maximum.
- (b) Chert or chalcedony, 3.0%, maximum.
- (c) Tridymite or cristobalite, 1.0%, maximum.
- (d) Opal, 0.5%, maximum.
- (e) Natural volcanic glass in volcanic rocks, 3.0%, maximum.

2. Concrete mix with reactive aggregate shall meet the following requirements:

If aggregates are deemed potentially reactive as per ASTM C-1778 and fly ash or slag cement is included in proposed concrete mix design, proposed concrete mix including proposed aggregates shall be evaluated by ASTM C-1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.

If aggregates are deemed potentially reactive as per ASTM C-1778 and a straight cement mix without fly ash or slag cement is proposed for concrete mix design, aggregates shall be evaluated by ASTM C-1260. Mean mortar bar expansions at 16 days shall be less than 0.08%.

- H. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.

2.06 NOT USED

2.07 ADMIXTURES

- A. Air entraining agent shall be added to all concrete unless noted otherwise. The agent shall consist of a neutralized vinsol resin solution or a purified hydrocarbon with a cement catalyst which will provide entrained air in the concrete in accordance with ASTM C 260. The admixture proposed shall be selected in advance so that adequate samples may be obtained and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.
- B. The following admixtures are required or used for water reduction, slump increase, and/Oo adjustment of initial set. Admixtures permitted shall conform to the requirements of ASTM C 494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.

1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are "Eucon Series" by the Euclid Chemical Company, "Master Pozzoloth Series" by BASF, and "Plastocrete Series" by Sika Corporation.
2. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G. The high range water reducer shall be added to the concrete at either the batch plant or at the job site and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are "Eucon 37" or Plastol 5000 by the Euclid Chemical Company, "Master Rheobuild 1000 or Master Glenium Series" by BASF, and "Daracem 100 or Advaflow Series" by W.R. Grace.
3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are "Accelguard 80/90 or NCA" by the Euclid Chemical Company and "Daraset" by W.R. Grace.
4. A water reducing retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are "Eucon NR or Eucon Retarder 100" by the Euclid Chemical Company, "Pozzoloth Retarder" by BASF, and "Plastiment" by Sika Corporation.

C. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.

D. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review.

2.08 CONCRETE MIX DESIGN

A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed. Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

- B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.
1. Compressive Strength (28-Day)
 - a. Concrete Class A1 4,000 psi (minimum)
 - b. Concrete Class B 3,000 psi (minimum)
 2. Water/cementitious materials ratio, by weight

	Maximum	Minimum
a. Concrete Class A1	0.42	0.39
c. Concrete Class B	0.50	0.39
 3. Slump range 4" nominal unless high range water reducing admixture is used.
8" max if high range water reducing admixture is used.
 4. Air Content
 - a. Class A1 6% ±1.5%
 - b. Class B 3% Max (non air-entrained)

PART 3 -- EXECUTION

3.01 TRIAL MIXES

- A. When trial mixes are used to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350, an independent qualified testing laboratory designated and retained by the Contractor shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.
- B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143), air content (C 231) and unit weight (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as

follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. _____, Product _____." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 PRODUCTION OF CONCRETE

- A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready mix plant or from a site mixed plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.
- B. Ready-Mixed Concrete
 - 1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
 - 2. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
 - 3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
 - 4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.
 - 5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed before the drum has been revolved 300 revolutions and within the time requirements stated in Article 3.03 of this Section.

6. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:
 - a. Date and truck number
 - b. Ticket number
 - c. Mix designation of concrete
 - d. Cubic yards of concrete
 - e. Cement brand, type and weight in pounds
 - f. Weight in pounds of fine aggregate (sand)
 - g. Weight in pounds of coarse aggregate (stone)
 - h. Air entraining agent, brand, and weight in pounds and ounces
 - i. Other admixtures, brand, and weight in pounds and ounces
 - j. Water, in gallons, stored in attached tank
 - k. Water, in gallons, maximum that can be added without exceeding design water/cementitious materials ratio
 - l. Water, in gallons, actually used (by truck driver)
 - m. Time of loading
 - n. Time of delivery to job (by truck driver)

7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.

8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.

C. Site Mixed Concrete

1. Scales for weighing concrete ingredients shall be accurate when in use within ± 0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.

2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

a. Cement, fly ash, or slag cement	± 1 percent
b. Water	± 1 percent
c. Aggregates	± 2 percent
d. Admixtures	± 3 percent

3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.

4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a

manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.

5. Mixers with a rate capacity of 1 cu.yd. or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.
6. Except as provided below, batches of 1 cu. yd. or less shall be mixed for not less than 1 minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.
7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C 94 indicate that the time is sufficient to produce uniform concrete.
8. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.
9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.
10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer.
11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.
12. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.
13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C 94.

3.03 CONCRETE PLACEMENT

- A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.
- B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice and

foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures which are subsequently required.

- C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture or cement grout shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.
- D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.
- E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided that the design water-cementitious materials ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix that meets all specified requirements.
- F. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients. It shall be so deposited that rehandling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.09 of this Section.
- G. Where concrete is conveyed to position by chutes, a practically continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such as to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise.
- H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in all forms in such way as to prevent any segregation.
- I. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.
- J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet and a sufficient number shall be placed in the form to ensure the concrete is kept level at all times.

- K. When placing concrete which is to be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.
- L. Concrete shall be placed so as to thoroughly embed all reinforcement, inserts, and fixtures.
- M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. To achieve this, concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.
- N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.
- O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration, however, shall not be continued in any one location to the extent that pools of grout are formed.
- P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall be such as to ensure that each layer is placed while the previous layer is soft or plastic, so that the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.
- Q. To prevent feathered edges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.
- R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and waterstops, and/or any proposed deviations from the aforementioned to the Engineer for review and approval.
- S. Concrete shall not be placed during rains sufficiently heavy or prolonged to wash mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.04 PLACING FLOOR SLABS ON GRADE

- A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the materials testing consultant.
- B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50° long enough to remove all frost from the subgrade.
- C. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall be no free water standing on the subgrade nor any muddy or soft spots when the concrete is placed.
- D. Thirty-pound felt paper shall be provided between edges of slab-on-grade and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.
- E. Contraction joints shall be provided in slabs-on-grade at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03290 - Joints in Concrete.
- F. Floor slabs shall be screeded level or pitched to drain as indicated on the Drawings. Finishes shall conform with requirements of Section 03350 - Concrete Finishes. Interior floor slabs shall be placed with non-air-entrained concrete (Class A3) if a steel troweled or hardened finish is required.

3.05 NOT USED

3.06 PLACING CONCRETE UNDER PRESSURE

- A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. To obtain the least line resistance, the layout of the pipeline system shall contain a minimum number of bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.
- B. Priming of the concrete pumping equipment shall be with cement grout only. Use of specialty mix pump primers or pumping aids will not be allowed.
- C. No aluminum parts shall be in contact with the concrete during the entire placing of concrete under pressure at any time.
- D. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a materials testing consultant proving the proposed mix meets all requirements. In addition, an actual pumping test under field conditions is required prior to acceptance of the mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used; the same pump and operator shall be present and the pipe and pipe layouts will

reflect the maximum height and distance contemplated. All submissions shall be subject to approval by the Engineer.

- E. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- F. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.
- G. The minimum diameter of the hose (conduits) shall be four inches.
- H. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.
- I. Concrete samples for quality control in accordance with Article 3.10 will be taken at the placement (discharge) end of the line.

3.07 ORDER OF PLACING CONCRETE

- A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.08 CONCRETE WORK IN COLD WEATHER

- A. Cold weather concreting procedures shall conform to the requirements of ACI 306.
- B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.
- C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature in excess of 100°F. in order to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.09 CONCRETE WORK IN HOT WEATHER

- A. Hot weather concreting procedures shall conform to the requirements of ACI 305.
- B. When air temperatures exceed 85°F., or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing,

finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand in position prior to each placing operation.

- C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.
- D. The temperature of the concrete mix when placed shall not exceed 90°F.
- E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being taken into account. Stockpiled aggregates shall, if necessary, be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, it must be entirely melted prior to addition of the water to the dry mix.
- F. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.
- G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.10 QUALITY CONTROL

A. Field Testing of Concrete

- 1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant personnel as required for concrete testing.
- 2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

- 1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.
- 2. Slump tests shall be made in accordance with ASTM C 143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. Concrete with a specified nominal slump shall be placed having a slump within 1" (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Unit Weight

1. Samples of freshly mixed concrete shall be tested for unit weight by the materials testing consultant in accordance with ASTM C 138.
2. Unit weight tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C 231.
2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.
3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C 172, C 31 and C 39, except as modified herein.
2. In general, one sampling shall be taken for each placement in excess of five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater.
3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.
4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders for testing. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C 31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds and such that all specimen are shielded

from direct sunlight and/or radiant heating sources. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.

5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of test specimens with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day curing box contains test specimens. Temperature shall be recorded a minimum of three times a day with one recording at the start of the work day and one recording at the end of the work day.
6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.
7. Compression tests shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.
2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.
 - a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.08).
 - b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.
3. In the event any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.
4. In the event that condition 2B is not met, additional tests in accordance with Article 3.10, paragraph H shall be performed.
5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
 - a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
 - b. Maintain or add temporary structural support as required.

- c. Correct the mix for the next concrete placement operation, if required to remedy the situation.
- 6. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at no additional cost to the Owner.
- G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.
- H. Additional Tests
 - 1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.
 - 2. In the event the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.10, paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.
 - a. Three cores shall be taken for each sample in which the strength requirements were not met.
 - b. The drilled cores shall be obtained and tested in conformance with ASTM C 42. The tests shall be conducted by a materials testing consultant approved by the Engineer.
 - c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.
 - d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.
 - e. The diameter of core specimens should be at least 3 times the maximum nominal size of the course aggregate used in the concrete, but must be at least 2-inches in diameter.
 - f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.
 - g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.
 - h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.
 - 3. In the event that concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant

approved by the Engineer, to obtain and test samples for air content in accordance with ASTM Specification C 457.

3.11 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.
- B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed.
- C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed.
- D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced, or repaired as directed. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an approved epoxy injection system. Non-structural cracks shall be repaired using an approved hydrophilic resin pressure injected grout system, unless other means of repair are deemed necessary and approved. All repair work shall be performed at no additional cost to the Owner.
- E. Concrete which fails to meet the strength requirements as outlined in Article 3.10, paragraph F, will be analyzed as to its adequacy based upon loading conditions, resultant stresses and exposure conditions for the particular area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be as directed by the Engineer.

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SECTION 03370
CONCRETE CURING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03100 – Concrete Formwork
- B. Section 03300 – Cast-In-Place Concrete
- C. Section 03350 – Concrete Finishes

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. ACI 301 – Specifications for Structural Concrete for Buildings
 - 2. ACI 304 – Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 3. ACI 305 – Hot Weather Concreting
 - 4. ACI 306 – Cold Weather Concreting
 - 5. ACI 308 – Standard Practice for Curing Concrete
 - 6. ASTM C171 – Standard Specifications for Sheet Materials for Curing Concrete
 - 7. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - 8. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.

1. Proposed procedures for protection of concrete under wet weather placement conditions.
2. Proposed normal procedures for protection and curing of concrete.
3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
4. Proposed method of measuring concrete surface temperature changes.
5. Manufacturer's literature and material certification for proposed curing compounds.

PART 2 -- PRODUCTS

2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

- A. Clear curing and sealing compound shall be a clear styrene acrylate type complying with ASTM C 1315, Type 1, Class A with a minimum solids content of 30%. Moisture loss shall not be greater than 0.40 kg/m² when applied at 300 sq.ft./gal. Manufacturer's certification is required. Acceptable products are Super Diamond Clear VOX by the Euclid Chemical Company, MasteKure CC 300 SB by BASF Master Builder Solutions, and Cure & Seal 30 Plus by Symons Corporation.
- B. Where specifically approved by Engineer, on slabs to receive subsequent applied finishes, compound shall conform to ASTM C 309. Acceptable products are "Kurez DR VOX" or "Kurez W VOX" by the Euclid Chemical Company. Install in strict accordance with manufacturer's requirements.

2.02 EVAPORATION REDUCER

- A. Evaporation reducer shall be BASF, "MasterKure ER 50", or Euclid Chemical "Euco-Bar".

PART 3 -- EXECUTION

3.01 PROTECTION AND CURING

- A. All freshly placed concrete shall be protected from the elements, flowing water and from defacement of any nature during construction operations.
- B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 5-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.
- C. Walls that will be exposed on one side with either fluid or earth backfill on the opposite side shall be continuously wet cured for a minimum of five days. Use of a curing compound will not be acceptable for applications of this type.

- D. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.
 - 1. Ponding or continuous fogging or sprinkling.
 - 2. Application of mats or fabric kept continuously wet.
 - 3. Continuous application of steam (under 150°F).
 - 4. Application of sheet materials conforming to ASTM C171.
 - 5. If approved by the Engineer, application of a curing compound in accordance with Article 3.04.
- E. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph D.
- F. Any of the curing procedures used in Paragraph 3.01-D may be replaced by one of the other curing procedures listed in Paragraph 3.01-D after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

- A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as placed temperatures specified in Section 03300, Cast-In-Place Concrete, for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20°F above the minimum as placed temperatures.
- B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.
- C. The methods of protecting the concrete shall be approved by the Engineer and shall be such as will prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.
- D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

- A. When air temperatures exceed 85°F, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to

guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

- B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.
- C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1 or 2 listed in paragraph 3.01D is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.
- D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least six (6) additional days using one of the methods listed in paragraph 3.01D.
- E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

3.04 USE OF CURING COMPOUND

- A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side. A continuous wet cure for a minimum of five days is required for these applications. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.
- B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.
- C. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. Maximum coverage for the curing and sealing compound shall be 300 square feet per gallon for trowel finishes and 200 square feet per gallon for floated or broom surfaces. Maximum coverage for compounds placed where subsequent finishes will be applied shall be 200 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

3.05 EARLY TERMINATION OF CURING

- A. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:
 - 1. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

2. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

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SECTION 03400

PRECAST CONCRETE

PART 1 -- GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall construct all precast concrete items as required in the Contract Documents, including all appurtenances necessary to make a complete installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02604 - Utility Structures
- B. Section 03200 - Reinforcing Steel
- C. Section 03300 - Cast-in-Place Concrete
- D. Section 03600 - Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the end of the Bid.

- 1. North Carolina Building Code
- 2. ACI 318-Building Code Requirements for Structural Concrete
- 3. PCI Standard MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
- 4. PCI Design Handbook

1.04 SUBMITTALS

- A. The Contractor shall submit the following for review in accordance with Section 01300, Submittals.
 - 1. Shop drawings for all precast concrete items showing all dimensions, locations, and type of lifting inserts, and details of reinforcement and joints.
 - 2. A list of the design criteria used by the manufacturer for all manufactured, precast items.

3. Design calculations, showing at least the design loads and stresses on the item, shall be submitted. Calculations shall be signed and sealed by a Professional Engineer currently registered in the State of North Carolina.
4. Certified reports for all lifting inserts, indicating allowable design loads.
5. Information on lifting and erection procedures.

1.05 QUALITY ASSURANCE

- A. All manufactured precast concrete units shall be produced by an experienced manufacturer regularly engaged in the production of such items. All manufactured precast concrete and site-cast units shall be free of defects, spalls, and cracks. Care shall be taken in the mixing of materials, casting, curing and shipping to avoid any of the above. The Engineer may elect to examine the units at the casting yard or upon arrival of the same at the site. The Engineer shall have the option of rejecting any or all of the precast work if it does not meet with the requirements specified herein or on the Drawings. All rejected work shall be replaced at no additional cost to the Owner.
- B. **Manufacturer Qualifications**

The precast concrete manufacturing plant shall be certified by the Prestressed Concrete Institute, Plant Certification Program, prior to the start of production. Certification is only required for plants providing prestressed structural members such as hollow core planks, double-T members, etc.
- C. Plant production and engineering must be under direct supervision and control of an Engineer who possesses a minimum of five years experience in precast concrete work.

PART 2 -- PRODUCTS

2.01 CONCRETE

- A. Concrete materials including portland cement, aggregates, water, and admixtures shall conform to Section 03300, Cast-in-Place Concrete.
- B. For prestressed concrete items, minimum compressive strength of concrete at 28 days shall be 5,000 psi unless otherwise specified. Minimum compressive strength of concrete at transfer of prestressing force shall be 3,500 psi unless otherwise specified.
- C. For non-prestressed concrete items, minimum compressive strength of concrete at 28 days shall be 4000 psi unless otherwise specified.

2.02 GROUT

- A. Grout for joints between panels shall be a cement grout in conformance with Section 03600, Grout.
- B. Minimum compressive strength of grout at 7 days shall be 3,000 psi.

2.03 REINFORCING STEEL

- A. Reinforcing steel used for precast concrete construction shall conform to Section 03200, Reinforcing Steel.

2.04 PRESTRESSING STRANDS

- A. Prestressing strands shall be 7-wire, stress-relieved, high-strength strands Grade 250K or 270K.

2.05 STEEL INSERTS

- A. All steel inserts protruding from or occurring at the surface of precast units shall be galvanized.

2.06 BEARING PADS

- A. Plastic bearing pads shall be multi-monomer plastic strips which are non-leaching and support construction loads with no visible overall expansion, manufactured specifically for the purpose of bearing precast concrete.

PART 3 -- EXECUTION

3.01 FABRICATION AND CASTING

- A. All precast members shall be fabricated and cast to the shapes, dimensions and lengths shown on the Drawings and in compliance with PCI MNL-116. Precast members shall be straight, true and free from dimensional distortions, except for camber and tolerances permitted later in this clause. All integral appurtenances, reinforcing, openings, etc., shall be accurately located and secured in position with the form work system. Form materials shall be steel and the systems free from leakage during the casting operation.
- B. All cover of reinforcing shall be the same as detailed on the Drawings.
- C. Because of the critical nature of the bond development length in prestressed concrete panel construction, if the transfer of stress is by burning of the fully tensioned strands at the ends of the member, each strand shall first be burned at the ends of the bed and then at each end of each member before proceeding to the next strand in the burning pattern.
- D. The Contractor shall coordinate the communication of all necessary information concerning openings, sleeves, or inserts to the manufacturer of the precast members.
- E. Concrete shall be finished. Grout all recesses due to cut tendons which will not otherwise be grouted during erection.
- F. Use of a membrane curing compound will not be allowed.
- G. The manufacturer shall provide lifting inserts or other approved means of lifting members.

3.02 HANDLING, TRANSPORTING AND STORING

- A. Precast members shall not be transported away from the casting yard until the concrete has reached the minimum required 28 day compressive strength and a period of at least 5 days has elapsed since casting, unless otherwise permitted by the Engineer.
- B. No precast member shall be transported from the plant to the job site prior to approval of that member by the plant inspector. This approval will be stamped on the member by the plant inspector.
- C. During handling, transporting, and storing, precast concrete members shall be lifted and supported only at the lifting or supporting points as indicated on the shop drawings.
- D. All precast members shall be stored on solid, unyielding, storage blocks in a manner to prevent torsion, objectionable bending, and contact with the ground.
- E. Precast concrete members shall not be used as storage areas for other materials or equipment.
- F. Precast members damaged while being handled or transported will be rejected or shall be repaired in a manner approved by the Engineer.

3.03 ERECTION

- A. Erection shall be carried out by the manufacturer or under his supervision using labor, equipment, tools and materials required for proper execution of the work.
- B. Contractor shall prepare all bearing surfaces to a true and level line prior to erection. All supports of the precast members shall be accurately located and of required size and bearing materials.
- C. Installation of the precast members shall be made by leveling the top surface of the assembled units keeping the units tight and at right angles to the bearing surface.
- D. Grouting between adjacent precast members and along the edges of the assembled precast members shall be accomplished as indicated on the drawings, care being taken to solidly pack such spaces and to prevent leakage or droppings of grout through the assembled precast members. Any grout which seeps through the precast members shall be removed before it hardens.
- E. In no case shall concentrated construction loads, or construction loads exceeding the design loads, be placed on the precast members. In no case shall loads be placed on the precast members prior to the welding operations associated with erection, and prior to placing of topping (if required).
- F. No Contractor, Subcontractor or any of his employees shall arbitrarily cut, drill, punch or otherwise tamper with the precast members.

- G. Precast members damaged while being erected will be rejected or shall be repaired in a manner approved by the Engineer.

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SECTION 03600

GROUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide grout as required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Requirements of related work are included in Division 1 and Division 2 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

- | | | |
|----|-------------|---|
| 1. | CRD-C 621 | Corps of Engineers Specification for Non-shrink Grout |
| 2. | ASTM C 109 | Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens) |
| 3. | ASTM C 531 | Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacing |
| 4. | ASTM C 579 | Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing |
| 5. | ASTM C 827 | Standard Test Method for Early Volume Change of Cementitious Mixtures |
| 6. | ASTM C 144 | Standard Specification for Aggregate for Masonry Mortar |
| 7. | ASTM C 1107 | Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink) |

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals.
 - 1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein.

2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

1.05 QUALITY ASSURANCE

A. Field Tests

1. Compression test specimens will be taken during construction from the first placement of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. The specimens will be made by the Engineer or its representative.
 - a. Compression tests and fabrication of specimens for cement grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.
3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland Cement and sand in the proportion of one part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White portland cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.
2. The minimum compressive strength at 28 days shall be 4000 psi.
3. Sand shall conform to the requirements of ASTM C144.

2.02 CURING MATERIALS

- A. Curing materials shall as recommended by the manufacturer for prepackaged grouts.

PART 3 -- EXECUTION

3.01 GENERAL

- A. Cement grout shall be used for grouting voids encountered outside the casing pipe.
- B. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- C. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

3.02 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application.

3.03 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3.04 GROUT INSTALLATION

- A. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer.

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SECTION 09900

PAINTING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Furnish labor, materials, equipment and appliances required for complete execution of Work shown on Drawings and Specified herein.
- B. Section Includes:
 - 1. Paint Materials
 - 2. Shop Painting
 - 3. Field Painting
 - a. Surface Preparation
 - b. Piping and Equipment Identification
 - c. Schedule of Colors
 - d. Work in Confined Spaces
 - e. OSHA Safety Colors

1.02 RELATED SECTIONS

- A. Section 15390 - Schedules

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of these specifications the Work shall conform to the applicable requirements of the following documents:
 - 1. SSPC - Steel Structures Painting Council
 - a. SSPC-Vis 1 Pictorial Surface Preparation Standards for Painting Steel Structures
 - b. SSPC-SP2 Hand Tool Cleaning
 - c. SSPC-SP3 Power Tool Cleaning
 - d. SSPC-SP5 White Metal Blast Cleaning
 - e. SSPC-SP6 Commercial Blast Cleaning

- f. SSPC-SP10 Near-White Metal Blast
- 2. NACE - National Association of Corrosion Engineers
- 3. ASTM D1737 - Test Method for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus
- 4. ASTM B117 - Method of Salt Spray (Fog) Testing
- 5. ASTM D4060 - Test Method for Abrasion Resistance of Organic Coating by the Taber Abraser
- 6. ASTM D3359 - Method for Measuring Adhesion by Tape Test

1.04 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01300 - Submittals, submit the following:
 - 1. Manufacturer's literature and Material Safety Data Sheets for each product.
 - 2. Painting schedule identifying surface preparation and paint systems proposed. Cross-reference with Tables 9-1 and 9-2. Provide the name of the paint manufacturer, and name, address, and telephone number of manufacturer's representative who will inspect the work. Submit schedule for approval as soon as possible following the Award of Contract, so approved schedule may be used to identify colors and specify shop paint systems for fabricated items.

1.05 SYSTEM DESCRIPTION

- A. Work shall include surface preparation, paint application, inspection of painted surfaces and corrective action required, protection of adjacent surfaces, cleanup and appurtenant work required for the proper painting of all surfaces to be painted. Surfaces to be painted are designated within the Painting Schedule and may include new and existing piping, miscellaneous metals, equipment, buildings, exterior fiberglass, exposed electrical conduit and appurtenance.
- B. Perform Work in strict accordance with manufacturer's published recommendations and instructions, unless the Engineer stipulates that deviations will be for the benefit of the project.
- C. Paint surfaces which are customarily painted, whether indicated to be painted or not, with painting system applied to similar surfaces, areas and environments, and as approved by Engineer.
- D. Piping and equipment shall receive color coding and identification. Equipment shall be the same color as the piping system.

1.06 QUALITY ASSURANCE

- A. Painting operations shall be accomplished by skilled craftsman and licensed by the state to perform painting work.
- B. Provide a letter indicating that the painting applicator has five years of experience, and 5 references which show previously successful application of the specified or comparable painting systems. Include the name, address, and the telephone number for the Owner of each installation for which the painting applicator provided services.

1.07 STORAGE AND DELIVERY

- A. Bring materials to the job site in the original sealed and labeled containers.
- B. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

PART 2 -- MATERIALS

2.01 GENERAL INFORMATION

- A. The term "paint" is defined as both paints and coatings including emulsions, enamels, stains, varnishes, sealers, and other coatings whether organic or inorganic and whether used as prime, intermediate, or finish coats.
- B. Purchase paint from an approved manufacturer. Manufacturer shall assign a representative to inspect application of their product both in the shop and field. The manufacturer's representative shall submit a report to the Engineer at the completion the Work identifying products used and verifying that surfaces were properly prepared, products were properly applied, and the paint systems were proper for the exposure and service.
- C. Provide primers and intermediate coats produced by same manufacturer as finish coat. Use only thinners approved by paint manufacturer, and only within manufacturer's recommended limits.
- D. Ensure compatibility of total paint system for each substrate. Test shop primed equipment delivered to the site for compatibility with final paint system. Provide an acceptable barrier coat or totally remove shop applied paint system when incompatible with system specified, and repaint with specified paint system.
- E. Use painting materials suitable for the intended use and recommended by paint manufacturer for the intended use.
- F. Require that personnel perform work in strict accordance with the latest requirements of OSHA Safety and Health Standards for construction. Meet or exceed requirements of regulatory agencies having jurisdiction and the manufacturer's published instructions and

recommendations. Maintain a copy of all Material Safety Data Sheets at the job site of each product being used prior to commencement of work. Provide and require that personnel use protective and safety equipment in or about the project site. Provide respiratory devices, eye and face protection, ventilation, ear protection, illumination and other safety devices required to provide a safe work environment.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Specifications, provide products from one of the following manufacturers:
 - 1. Tnemec Company Inc.
 - 2. Ameron
 - 3. CARBOLINE
 - 4. Sherwin-Williams

PART 3 -- EXECUTION

3.01 SHOP PAINTING

- A. Shop prime fabricated steel and equipment with at least one shop coat of prime paint compatible with finish paint system specified. Prepare surface to be shop painted in strict accordance with paint manufacturer's recommendations and as specified. Finish coats may be shop applied, if approved by the Engineer. Package, store and protect shop painted items until they are incorporated into Work. Repair painted surfaces damaged during handling, transporting, storage, or installation to provide a painting system equal to the original painting received at the shop.
- B. Identify surface preparation and shop paints on Shop Drawings. Verify compatibility with field applied paints. Shop Drawings indicating shop painting will not be approved until project paint system has been submitted to and approved by the Engineer.

3.02 SURFACE PREPARATION

- A. General
 - 1. Surfaces to be painted shall be clean and dry, and free of dust, rust, scale, and foreign matter. No solvent cleaning, power or hand tool cleaning shall be permitted unless approved by the Engineer.
 - 2. Protect or remove, during painting operations, hardware, accessories, machined surfaces, nameplates, lighting fixtures, and similar items not intended to be painted prior to cleaning and painting. Reposition items removed upon completion of painting operations.
 - 3. Examine surfaces to be coated to determine that surfaces are suitable for specified surface preparation and painting. Report in writing to Engineer surfaces found to be unsuitable. Do not start surface preparation until unsuitable surfaces have been

corrected. Starting surface preparation precludes subsequent claim that such surfaces were unsuitable for the specified surface preparation or painting.

4. Surface preparation shall be in accordance with specifications and manufacturer's recommendations. Provide additional surface preparation, and fill coats where manufacturer recommends additional surface preparation, in addition to requirements of specification.
5. Touch-up coats are in addition to and not considered the first field coat.
6. Protect motors and other equipment during blasting operation to ensure blasting material is not blown into motors or other equipment. Inspect motors and other equipment after blasting operations and certify that no damage occurred, or where damage occurred, the proper remedial action was taken.
7. Field paint shop painted equipment in compliance with Color Coding and as approved by Engineer.

B. Metal Surface Preparation

1. Conform to current Steel Structures Painting Council (SSPC) Specifications for metal surface preparation. Use SSPC-Vis-1 pictorial standards or NACE visual standards TM-01-70 or TM-01-75 to determine cleanliness of abrasive blast cleaned steel.
2. Perform blast cleaning operations for metal when following conditions exist:
 - a. Moisture is not present on the surface.
 - b. Relative humidity is below 80%.
 - c. Ambient and surface temperatures are 5°F or greater than the dew point temperature.
 - d. Painting or drying of paint is not being performed in the area.
 - e. Equipment is in good operating condition.
 - f. Proper ventilation, illumination, and other safety procedures and equipment are being provided and followed.
3. Sandblast ferrous metals to be shop primed, or component mechanical equipment in accordance with SSPC-SP5, White Metal Blast.
4. Sandblast field prepared ferrous metals in accordance with SSPC-SP10, Near White Metal Blast, where metal is to be submerged, in a corrosive environment, or in severe service.
5. Sandblast field prepared ferrous metals in accordance with SSPC-SP6 Commercial Blast, where metal is to be used in mild or moderate service, or non-corrosive environment.

6. Clean nonferrous metals, copper, or galvanized metal surfaces in accordance to SSPC-SP1, Solvent Cleaning, or give one coat of metal passivator or metal conditioner compatible with the complete paint system.
7. Prime cleaned metals immediately after cleaning to prevent rusting.
8. Clean rusted metals down to bright metal by sandblasting and immediately field primed.

C. Concrete Surface Preparation

1. Cure concrete a minimum of 30 days before surface preparation, and painting begins.
2. Test concrete for moisture content using test method recommended by the paint manufacturer. Do not begin surface preparation, or painting until moisture content is acceptable to manufacturer.
3. Brush-off blast (Reference ASTM D 4259) concrete to remove contaminants, open bugholes, surface voids, air pockets, and other subsurface irregularities. Do not expose underlying aggregate. Use dry, oil-free air for blasting operations. Surface texture after blasting shall be similar to that of medium grit sandpaper. Remove residual abrasives, dust, and loose particles by vacuuming or blowing with high pressure air.
4. Acid etch (Reference ASTM D 260) concrete floors to receive paint. Following method is a minimum requirement. Remove residual dust and dirt. Wet surface of concrete until surface is damp. Etch surface with 15% to 20% muriatic acid solution to produce a "medium sandpaper" texture. Do not allow acid solution to dry on concrete. Rinse concrete when bubbling action of the acid begins to subside. Continue rinsing process until pH is 7 or higher. Remove excess water and allow concrete to thoroughly dry before coating. Other methods may be used, if approved by Engineer.
5. Surface defects, such as hollow areas, bugholes, honeycombs, and voids shall be filled with polymeric filler compatible with painting system. Complete fill coats may be used in addition to specified painting system and as approved by the Engineer. Fins, form marks, and all protrusions or rough edges shall be removed.
6. Repair existing concrete surfaces which are deteriorated to the point that surface preparation exposes aggregate with fill coats or patching mortar as recommended by paint manufacturer and as directed by the Engineer.
7. Clean concrete of all dust, form oils, curing compounds, oil, tar, laitance, efflorescence, loose mortar, and other foreign materials before paints are applied.

D. Wood

1. Clean wood surfaces free of all foreign matter, with cracks and nail holes and other defects properly filled and smoothed. Remove sap and resin by scraping and wipe clean with rags dampened with mineral spirits.

2. Saturate end grain, cut wood, knots, and pitch pockets with an appropriate sealer before priming.
3. Prime and backprime wood trim before setting in place.
4. After prime coat has dried, fill nailholes, cracks, open joints, and other small holes with approved spackling putty. Lightly sand wood trim prior to applying second coat of paint.

E. Castings

1. Prepare castings for painting by applying a brush or a knife-applied filler. Fillers are not to be used to conceal cracks, gasholes, or excessive porosity.
2. Apply one coat of primer with a minimum thickness of 1.2 mils in addition to coats specified. Allow sufficient drying time before further handling.

F. Masonry

1. Cure for a minimum of 30 days prior to paint application.
2. Clean masonry surfaces free from all dust, dirt, oil, grease, loose mortar, chalky deposits, efflorescence, and other foreign materials.
3. Test masonry for moisture content. Use test method recommended by paint manufacturer. Do not begin painting until moisture content is acceptable to manufacturer.

G. Gypsum Drywall

1. Sand joint compound with sandpaper to provide a smooth flat surface. Avoid sanding of adjacent drywall paper.
2. Remove dust, dirt, and other contaminants.

H. Previously-Painted Surfaces

1. Totally remove existing paint when: surface is to be submerged in a severe environment, paint is less than 75% intact, brittle, eroded or has underfilm rusting.
2. Surfaces which are greater than 75% intact require removal of failed paints and then spot primed. Spot priming is in addition to coats specified.
3. Remove surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers.
4. Clean and dull glossy surfaces prior to painting in accordance with the manufacturer's recommendations.
5. Check existing paints for compatibility with new paint system. If incompatible, totally remove existing paint system or apply a barrier coat recommended by the paint manufacturer. Remove existing paints of undetermined origin. Prepare a test patch

of approximately 3 square feet over existing paint. Allow test patch to dry thoroughly and test for adhesion. If proper adhesion is not achieved remove existing paint and repaint.

3.03 APPLICATION OF PAINT

- A. Apply paint by experienced painters with brushes or other applicators approved by the Engineer, and paint manufacturer.
- B. Apply paint without runs, sags, thin spots, or unacceptable marks.
- C. Apply at rate specified by the manufacturer to achieve at least the minimum dry mil thickness specified. Apply additional coats, if necessary, to obtain thickness.
- D. Special attention shall be given to nuts, bolts, edges, angles, flanges, etc., where insufficient film thicknesses are likely. Stripe paint prior to applying prime coat. Stripe painting shall be in addition to coats specified.
- E. Perform thinning in strict accordance with the manufacturer's instructions, and with the full knowledge and approval of the Engineer and paint manufacturer.
- F. Allow paint to dry a minimum of twenty-four hours between applications of any two coats of paint on a particular surface, unless shorter time periods are a requirement by the manufacturer. Longer drying times may be required for abnormal conditions as defined by the Engineer and paint manufacturer. Do not exceed manufacturer's recommended drying time between coats.
- G. Suspend painting when any of the following conditions exist:
 - 1. Rainy or excessively damp weather.
 - 2. Relative humidity exceeds 85%.
 - 3. General air temperature cannot be maintained at 50°F or above through the drying period, except on approval by the Engineer and paint manufacturer.
 - 4. Relative humidity will exceed 85% or air temperature will drop below 40°F within 18 hours after application of paint.
 - 5. Surface temperature of item is within 5 degrees of dewpoint.
 - 6. Dew or moisture condensation is anticipated.
 - 7. Surface temperature exceeds the manufacturer's recommendations.

3.04 INSPECTION

- A. Each field coat of paint will be inspected and approved by the Engineer or his authorized representative before succeeding coat is applied. Tint successive coats so that no two coats for a given surface are exactly the same color. Tick-mark surfaces to receive black paint in white between coats.

- B. Use magnetic dry film thickness gauges and wet film thickness gauges for quality control. Furnish magnetic dry film thickness gauge for use by the Engineer.
- C. Coatings shall pass a holiday detector test.
- D. Determination of Film Thickness: Randomly selected areas, each of at least 107.5 contiguous square feet, totaling at least 5% of the entire control area shall be tested. Within this area, at least 5 squares, each of 7.75 square inches, shall be randomly selected. Three readings shall be taken in each square, from which the mean film thickness shall be calculated. No more than 20 percent of the mean film thickness measurements shall be below the specified thickness. No single measurement shall be below 80 percent of the specified film thickness. Total dry film thickness greater than twice the specified film thickness shall not be acceptable. Areas where the measured dry film thickness exceeds twice that specified shall be completely redone unless otherwise approved by the Engineer. When measured dry film thickness is less than that specified additional coats shall be applied as required.
- E. Holiday Testing: Holiday test painted ferrous metal surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures. Mark areas which contain holidays. Repair or repaint in accordance with paint manufacturer's printed instructions and retest.
 - 1. Dry Film Thickness Exceeding 20 Mills: For surfaces having a total dry film thickness exceeding 20 mils: Pulse-type holiday detector such as Tinker & Razor Model AP-W, D.E. Stearns Co. Model 14/20, shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.
 - 2. Dry Film Thickness of 20 Mills or Less: For surfaces having a total dry film thickness of 20 mils or less: Tinker & Razor Model M1 non-destructive type holiday detector, K-D Bird Dog, shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flow, shall be added to the water prior to wetting the detector sponge.
- F. Paint manufacturer or his representative shall provide their services as required by the Engineer. Services shall include, but not be limited to, inspecting existing paint, determination of best means of surface preparation, inspection of completed work, and final inspection of painted work 11 months after the job is completed.

3.05 PROTECTION OF ADJACENT PAINT AND FINISHED SURFACES

- A. Use covers, masking tape, other method when protection is necessary, or requested by Owner or Engineer. Remove unwanted paint carefully without damage to finished paint or surface. If damage does occur, repair the entire surface adjacent to and including the damaged area without visible lapmarks and without additional cost to the Owner.
- B. Take all necessary precautions to contain dispersion of sandblasting debris and paint to the limits of the work. Take into account the effect of wind and other factors which may cause dispersion of the sandblasting debris and paint. Suspend painting operations when sanding debris or paint cannot be properly confined. Assume all responsibilities and cost associated

with damage to adjacent structures, vehicles, or surfaces caused by the surface preparation and painting operations.

3.06 PIPING AND EQUIPMENT IDENTIFICATION

- A. Piping and equipment identification shall be in accordance with Section 15030, Piping and Equipment Identification Systems.

3.07 SCHEDULE OF COLORS

- A. Colors which are not indicated shall be selected from the manufacturer's full range of colors by the Engineer. No variation shall be made in colors without the Engineer's approval. Color names and numbers shall be identified according to the appropriate color chart issued by the manufacturer of the particular product in question.

3.08 WORK IN CONFINED SPACES

- A. Provide and maintain safe working conditions for all employees. Supply fresh air continuously to confined spaces through the combined use of existing openings, forced-draft fans and temporary ducts to the outside, or direct air supply to individual workers. Exhaust paint fumes to the outside from the lowest level in the contained space. Provide explosion-proof electrical fans, if in contact with fumes. No smoking or open fires will be permitted in, or near, confined spaces where painting is being done. Follow OSHA, state and local regulations at all times.

TABLE 9-1
PAINING SCHEDULE

SURFACE	APPLICATION	PAINING SYSTEM & NO. OF COATS	PRODUCT REFERENCE (TABLE 9.2)	TOTAL MIN. DRY FILM THICKNESS (MILS)
<u>Metals</u>				
Exterior nonsubmerged (gloss)	All vent pipes and appurtenances	1 coat epoxy polyamide primer	104	4-6
		1 coat epoxy polyamide 1 coat aliphatic polyurethane	102 115	4-6 3-5
<u>Structural steel, misc. metals (steel)</u>	All new structures	1 coat epoxy polyamide 1 coat aliphatic polyurethane	102 115	5-8 3-4
<u>Shop Primed Structural Steel</u>	All new structures	1 barrier coat 1 coat epoxy 1 coat epoxy	113 114 120	2-3 3-4 3-4

**TABLE 9-2
PRODUCT LISTING**

<u>REF.</u>	<u>SYSTEM</u>	<u>PURPOSE</u>	<u>PRODUCT</u>			
			<u>Tnemec Series</u>	<u>AMERON</u>	<u>CARBOLINE</u>	<u>Sherwin-Williams</u>
102	Epoxy polyamide	Finish coat semi-gloss or gloss	66	AMERCOAT 385	Carboline 890	Macropoxy 646
104	Epoxy Polyamide – metal	Primer	66	AMERCOAT 385	Carboline 890	Macropoxy 646
113	Urethane	Barrier coat	530	--	--	--
114	Polyamine Epoxy	Intermediate coat	27	--	--	--
115	Aliphatic Polyurethane	Finish coat	1074 or 1075	AMERCOAT 450 HS	Carbothane 134HS	Acrolon 218HS
120	Epoxy	Top coat	N69	--	--	--

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SECTION 15000

BASIC MECHANICAL REQUIREMENTS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install to the required line and grade, all piping together with all fittings and appurtenances, required for a complete installation.
- B. The Contractor shall furnish and install fittings, couplings, connections, sleeves, adapters, harness rods and closure pieces as required to connect pipelines of dissimilar materials and/or sizes herein included under this Section and other concurrent Contracts for a complete installation.
- C. The Contractor shall furnish all labor, materials, equipment, tools, and services required for the furnishing, installation and testing of all piping as shown on the Drawings, specified in this Section and required for the Work. Piping shall be furnished and installed of the material, sizes, classes, and at the locations shown on the Drawings and/or designated in this Section. Piping shall include all fittings, adapter pieces, couplings, closure pieces, harnessing rods, hardware, bolts, gaskets, wall sleeves, wall pipes, hangers, supports, joint accessories and other associated appurtenances for required connections to equipment, valves, or structures for a complete installation.
- D. The work shall include, but not be limited to, the following:
 - 1. Connections to existing pipelines or manhole structures.
 - 2. Test excavations necessary to locate or verify existing pipe and appurtenances.
 - 3. Installation of all new pipe and materials required for a complete installation.
 - 4. Cleaning and testing as required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 1
- B. Division 2
- C. Division 3
- D. Division 9
- E. Division 15

1.03 MATERIAL CERTIFICATION AND SHOP DRAWINGS

- A. The Contractor shall furnish to the OWNER (through the Engineer) a Material Certification from the manufacturer stating that the pipe materials and specials furnished under this Section conform to all applicable provisions of the corresponding Specifications. Specifically, the Certification shall state compliance with the applicable standards (ASTM, AWWA, etc.) for fabrication and testing. Certifications shall be included in shop drawing submittal(s).
- B. Shop Drawings for piping systems shall be prepared and submitted in accordance with Section 01300 – Submittals. In addition to the requirements of Section 01300 – Submittals, the Contractor shall submit laying schedules and detailed Drawings in plan and profile for all major piping (2-inches in diameter and greater) as specified and shown on the Drawings.
- C. Shop Drawings shall include, but not be limited to complete piping layout, pipe material, sizes, class, locations, necessary dimensions, elevations, supports, hanger details, pipe joints, and the details of fittings including methods of joint restraint. No fabrication or installation shall begin until Shop Drawings are approved by the Engineer.
- D. Shop Drawings shall include copies of manufacturers written directions regarding material handling, delivery, storage and installation.
- E. Shop Drawings shall include written verification of required pressure, leakage and disinfection tests.

PART 2 -- PRODUCTS

2.01 GENERAL

- A. All specials and every length of pipe shall be marked with the manufacturer's name or trademark, size, class, and the date of manufacture. Special care in handling shall be exercised during delivery, distribution, and storage of pipe to avoid damage and unnecessary stresses. Damaged pipe will be rejected and shall be replaced at the Contractor's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter and protected from direct sunlight for long periods of time when recommended by the manufacturer.
- B. Testing of pipe before installation shall be as described in the corresponding ASTM or AWWA Specifications and in the applicable standard specifications listed in the following sections. Testing after the pipe is installed shall be as specified herein.
- C. Joints in piping shall be of the type as specified in the applicable individual specification section herein. Unless otherwise specified, all fasteners shall be Type 316 stainless steel with anti-galling compound
- D. Piping shall have restrained joints where shown on the Drawings. All exposed exterior piping shall have flanged joints, unless otherwise specified or shown on the Drawings.
- E. The Drawings indicate work affecting existing piping and appurtenances. The Contractor shall excavate test pits as required of all connections and crossings which may affect the Contractor's work prior to ordering pipe and fittings to determine sufficient information for

ordering materials. The Contractor shall take whatever measurements that are required to complete the work as shown or specified.

2.02 PIPE MATERIALS

- A. Pipe shall be as shown on the Drawings, listed in the Bid, and as specified in other Sections of Division 15 of these Contract Documents.

2.03 FLEXIBLE COUPLINGS

- A. Flexible couplings shall be flexible rubber coupling with stainless steel shear rings as manufactured by Fernco, Inc., Red Valve Company, or approved equal and shall consist of a molded reinforced fabric of cotton and natural rubber with 304 stainless steel retaining rings and retaining rods. End connections shall match ANSI 125 pound flanges with a minimum pressure rating of 140 psi. Where connected to non-ferrous piping, rubber shall be more flexible such that the coupling is not stiffer than the pipe.

2.04 TRACER WIRE

- A. No. 12 gage copper tracer wire shall be installed on all buried water and sewer pipelines and connecting structures such as manholes and valve boxes. Tracer wire shall be installed per the Standard Details within the Contract Drawings.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. All piping shall be installed by skilled workmen and in accordance with the best standard practice for piping installation as shown on the Drawings, specified or recommended by the pipe manufacturer where more strict. Proper tools and appliances for the safe and convenient handling and installing of the pipe and fittings shall be used. Great care shall be taken to prevent any pipe coating from being damaged on the inside or outside of the pipe and fittings. All pieces shall be carefully examined for defects, and no piece shall be installed which is known to be cracked, damaged, or otherwise defective. If any defective pieces should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor and at no additional cost. Pipe and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they are accepted in the complete work. All piping connections to equipment shall be provided with unions or coupling flanges located so that piping may be readily dismantled from the equipment. At certain applications, Dresser, Victaulic, or equal, couplings may also be used where permitted by the Engineer. All piping shall be installed in such a manner that it will be free to expand and contract without injury to itself or to structures and equipment to which it is connected. All piping shall be erected to accurate lines and grades with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent. All exposed piping shall be installed with vertical and horizontal angles properly related to adjoining surfaces or pipes to give the appearance of good workmanship. All piping shall be assembled without distortion or stress caused by misalignment – do not subject the piping to bending or other undue stresses during installation, and do not correct misalignment by distorting flanged joints or subjecting bolts to bending or undue stresses. Unless otherwise shown or approved, provided a minimum headroom clearance under all piping of 7 feet 6 inches. Install piping flat or with constant

slope to prevent creation of air traps. Install air bleed valves at all high points and wherever required for venting during filling or for sampling during testing. Install blow off valves at all low points of air piping. Protect all water lines from contamination.

- B. No pressure testing shall be performed until the pipe has been properly backfilled in place.
- C. JOINT DEFLECTION SHALL NOT EXCEED 50 PERCENT OF THE MANUFACTURERS RECOMMENDED DEFLECTION. Excavation and backfilling shall conform to the requirements of Section 02220, and as specified herein. Maximum trench widths shall conform to the Trench Width Excavation Limits shown on the Drawings or as indicated in Section 02220.
- D. Following proper preparation of the trench subgrade, pipe and fittings shall be carefully lowered into the trench so as to prevent dirt and other foreign substances from gaining entrance into the pipe and fittings. Inspect and clean each pipe length as required. Proper facilities shall be provided for lowering sections of pipe into trenches. UNDER NO CIRCUMSTANCES SHALL ANY OF THE MATERIALS BE DROPPED OR DUMPED INTO THE TRENCH.
- E. ALL PIPING SHALL HAVE TYPE BEDDING AS SHOWN ON THE DRAWINGS.
- F. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid by the Contractor at his own expense. Pipe shall not be laid in water or when trench conditions are unsuitable for work. Water shall be kept out of the trench until jointing and backfilling are completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no water, earth, or other substance will enter the pipes, fittings, or valves. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored as required. All piping shall be installed in such a manner that it will be free to expand and/or contract without injury to itself or to structures to which it is connected. During the laying of pipe, each pipe manufacturer shall provide his own supervisor to instruct the Contractor's pipe laying personnel in the correct procedure to be followed.
- G. Water shall be kept out of the trench until jointing and backfilling are completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no water, earth, or other substance will enter the pipes, fitting, or valves. Pipe ends left for future connections shall be valved, plugged, or capped, and secured as required. Due to the unavailability of adequate flushing water, Contractor shall take the utmost care to ensure pipeline is as clean as possible during installation.
- H. All piping shall be erected to the line and grade indicated on the Drawing unless otherwise approved by the Engineer, with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent. All exposed piping shall be installed with vertical and horizontal angles properly related to adjoining surfaces or pipes to give the appearance of good workmanship.
- I. Once trench subgrade has been prepared, bedding material shall be placed as shown on the Drawings. Bedding material beneath pipe shall be uncompacted before placing pipe, except where bedding material beneath pipe is more than 8 inches thick, place bedding in two lifts – first lift of 6 inches compacted to 95% relative compaction (modified Proctor), and remaining material uncompacted. The pipe shall then be placed. The full length of each section of pipe shall rest solidly upon the bed of the trench, with recesses excavated to accommodate bells, couplings, joints, and fittings. Before joints are made, each pipe shall

be well bedded on a solid foundation; and no pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Pipe that has the grade or joint disturbed after laying shall be taken up and re-laid by the Contractor at his own expense. Pipe shall not be laid in water or when trench conditions are unsuitable for work. Contractor shall be responsible for providing all dewatering equipment as required at his expense. After pipe is installed, place remaining bedding material in maximum 8-inch lifts compacted per the requirements of Section 02200. Backfill material shall be as specified in Section 02220.

- J. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall in general agree with manufacturer's recommendations.
 - K. Use a laser device to maintain the trench and pipe alignment. The laser device shall be re-checked for correct elevation and pipe alignment prior to pipe installation if the device is left in the pipe overnight. Corrected invert elevations at each manhole and any adjustments will be coordinated with and approved by the Engineer.
 - L. Use full lengths of pipe (as furnished by the pipe manufacturer) except for closure pieces at manholes or other structures.
 - M. The full length of each section of pipe shall rest solidly upon the bed of the trench, with recesses excavated to accommodate bells, couplings, joints, and fittings. Before joints are made, each pipe shall be well bedded on a solid foundation. No pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Pipe that has the grade or joint disturbed after laying shall be taken up and re-laid by the Contractor at his own expense
 - N. Pipes crossing within a vertical distance of less than or equal to one (1) foot shall be encased in No. 67 stone at the point of crossing to prevent damage to the adjacent pipes as shown on the Drawings.
 - O. No testing shall be performed until the pipe has been properly backfilled in place.
 - P. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall in general agree with manufacturer's recommendations.
 - Q. AT THE CLOSE OF WORK EACH DAY PIPELINE TRENCHES SHALL BE COMPLETELY COVERED. UNDER NO CONDITIONS SHALL ANY PIPELINE TRENCH BE LEFT UNCOVERED DURING NON-WORKING HOURS.
 - R. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid by the Contractor at his own expense.
 - S. Detector tape shall be installed below final grade and directly above all new buried sewer. The tape shall be 4-inches wide (minimum), green in color, and clearly and permanently labeled "SEWER". Detector tape shall be as manufactured by Pro-Line, Lineguard III, or approved equal.
- 3.02 REINFORCED CONCRETE PIPE, CONCRETE CULVERT, AND DRAIN PIPE (RCP)
- A. The laying of reinforced concrete pipe shall conform to the applicable sections of the Concrete Pipe Handbook as published by the American Concrete Pipe Association and

AWWA Manual M9. Prior to assembling the spigot end into the bell end, both ends shall be thoroughly cleaned and the rubber gasket and the bell end of the previously laid pipe shall be coated with vegetable soap furnished by the manufacturer. Any joint found in later tests to be faulty shall be repaired to the satisfaction of the Engineer at no additional cost.

3.03 DUCTILE IRON PIPE

- A. Ductile iron pipe (DIP) shall be installed in accordance with the requirements of the Ductile Iron Pipe Handbook published by the Ductile Iron Pipe Research Association, and AWWA C600. DIP shall be furnished as specified in Section 15006, Ductile Iron Pipe.
- B. Where it is necessary to cut ductile iron pipe in the field, such cuts shall be made carefully in a neat workmanlike manner using approved methods to produce a clean square cut. The outside of the cut end shall be conditioned for use by filing or grinding a small taper, at an angle of approximately 30 degrees.
- C. UNLESS OTHERWISE APPROVED BY THE ENGINEER, FIELD WELDING OF DUCTILE IRON WILL NOT BE PERMITTED.

3.04 PVC PIPE

- A. Polyvinyl chloride (PVC) pipe shall be laid and joints assembled as specified in the respective pipe Specification Sections and according to the respective manufacturer's recommendation. PVC pipe installation shall comply with applicable sections of the Uni-Bell PVC Pipe Association Recommended Standard Specifications. PVC piping shall be installed within four months of manufacture. PVC pipe shall be furnished as specified in Section 15008.
- B. Plastic piping shall not be installed when the temperature is less than 60°F except as otherwise recommended by the manufacturer and approved by the Engineer.
- C. All buried PVC sewer piping shall be air tested at 5 psi.

3.05 GLASS REINFORCED PLASTIC (GRP)

- A. Glass Reinforced Plastic (GRP) pipe shall be laid and joints assembled according to the respective manufacturer's recommendation. Trench width and backfill shall be in accordance with the Contract Drawings. GRP shall be furnished as specified in Section 15007, Glass-Reinforced Plastic (GRP) Gravity Sewer.

3.06 TYPICAL SEWER SERVICE INSTALLATION

- A. The Contractor shall furnish and install sewer services as specified herein and as shown on the Drawings including all fittings, transition pieces, cleanouts (if required) and appurtenances for a complete installation.
- B. Wherever used in the Contract Documents, the term sewer service shall mean a gravity flow pipe connecting a residence or building wastewater collection system to the main sewer line. All sewer services shall be 4-inch diameter, Schedule 40 PVC pipe, conforming to ASTM D1785, D1784, and F441, and as detailed in the Miscellaneous Standard Details within the Contract Drawings. Installation of a sewer service pipe shall be from the main sewer line to the extents indicated in the service lateral detail shown on the Drawings unless

sewer service is to replace an existing sewer service. Sewer services that are to replace existing sewer services shall include the service lateral plus any additional pipe, fittings, etc., required to connect to the existing sewer service. Sewer services will be in accordance with NC Plumbing Code. Pipe materials, joints, and connections shall be as specified herein and as shown on the Drawings.

- C. Sewer laterals shall be connected to the main by means of a sewer saddle, installed over a hole cut in the top quadrant of the main at an angle of forty-five degrees (45°), with respect to direction of flow. The hole shall be cut with a mechanical hole cutter designed for the particular use and rendering a smooth, uniform cut with no damage to the pipe.

3.07 JOINTS IN PIPING

- A. Ductile Iron Push-on joint pipe shall be installed in accordance with the Ductile Iron Pipe Installation Guide published by the Ductile Iron Pipe Research Association (DIPRA). Other pipe materials shall be installed in accordance with the manufacturer's instructions, AWWA and ASTM standards. The gasket shall be wiped clean, flexed and then placed in the socket. Any bulges in the gasket, which might interfere with the entry of the plain end of the pipe shall be removed. A thin film of lubricant shall be applied to the gasket surface, which will come into contact with the spigot end of the pipe. The lubricant shall be furnished by the pipe manufacturer. The plain end of the pipe, which is tapered for ease of assembly, shall be wiped clean and a thick film of lubricant applied to the outside. The pipe shall be aligned and carefully entered into the socket until it just makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be either pulled or pushed "home" as recommended by the pipe manufacturer. A timber header should be used to protect the bell of the pipe during homing operations. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.
- B. Restrained joints shall be provided as shown on the Drawings.
- C. Ductile Iron mechanical joints shall be made up with gaskets, glands and bolts. When a joint is to be made up, the bell or socket and plain end shall be cleaned and washed with a solution or mild soap in water; the gland and gasket shall be slid onto the plain end and the end then entered into the socket until it is fully "home" on the centering ring. The gasket shall then be painted with soapy water and slid into position, followed by the gland. All bolts shall be inserted and made up hand tight and then tightened alternately to bring the gland into position evenly. Excessive tightening of the bolts shall be avoided. All nuts shall be pulled up using a torque wrench which will not permit unequal stresses in the bolts. Torque shall not exceed the recommendations of the manufacturer of the pipe and bolts for the various sizes. Care shall be taken to assure that the pipe remains fully "home" while the joint is being made. Joints shall conform to the applicable AWWA Specifications.
- D. Joints of other piping materials shall be connected as indicated in the manufacturer's literature and applicable AWWA and ASTM requirements.

3.08 FLUSHING, TESTING AND INSPECTION

- A. All piping shall be properly cleaned and tested unless specifically exempted elsewhere in the Specifications or otherwise approved by the Engineer. Air and gas pipelines shall be flushed and tested with compressed air. Gravity sewer piping shall be air tested. All other liquid conveying pipelines shall be flushed and tested with water. The Contractor shall

furnish and install all means and apparatus necessary for getting the water into the pipe and filling and testing; including pumps, gages, and meters, any necessary plugs and caps, and any temporary blow off piping required to discharge water, etc., complete with any necessary reaction blocking to prevent pipe movement during the filling and testing. All pipe shall be tested in such lengths or sections as agreed upon among the Owner, Engineer, and Contractor. The Contractor shall give the Owner and Engineer reasonable notice of the time when he intends to test portions of the pipe. The Engineer reserves the right, within reason, to request testing of any section or portion of the pipe. The Engineer reserves the right, within reason, to request cleaning and testing of any section or portion of a pipeline.

- B. During testing the piping shall show **no** leakage. Any leaks or defective piping disclosed by the leakage test shall be repaired or replaced by the Contractor, at his own expense, and the test repeated until all such piping shows tight.
- C. After flushing, all liquid conveying pipelines shall be hydrostatically tested at the test pressure specified in the Piping System Schedule in Section 15390. During this test, exposed piping shall show **no** leakage.
- D. Any leaks or defective pipe disclosed by the hydrostatic test shall be repaired or replaced by the Contractor, at no additional cost, and the test repeated until all such piping shows tight.
- E. Gravity Sewers
 - 1. After backfilling, all sewers shall be inspected for obstructions and shall be cleaned by pulling a full diameter swab brush through the pipe. Sewers shall be swabbed until no evidence of debris remains and for a duration acceptable to the Engineer. Swabbing shall remove all dirt, stones, pieces of wood and other debris which accumulated in the sewer during construction. The Contractor shall provide a means acceptable to the Engineer for removal of debris swabbed from each section of sewer. If after swabbing, any obstructions remain, they shall be removed at the Contractor's expense.
 - 2. Visual Inspection - Sewers shall be visually inspected from every manhole by use of mirrors, television cameras, or other devices for visual inspection, and the pipe shall exhibit a full circular pattern when viewed from one manhole to the next. Sewers which do not exhibit a true line and grade or have structural defects shall be corrected to the satisfaction of the Engineer.
 - 3. Manholes will be tested in accordance with requirements set forth on Section 02604 – Utility Structures.
 - 4. Pipe less than 42" diameter shall be low pressure air tested in accordance with Paragraph 3.09 below. Minimum 5 psi test pressure.
 - 5. Pipe 42" diameter and larger shall be joint tested in accordance with Paragraph 3.11 herein.

3.09 LOW PRESSURE AIR TESTING GRAVITY PIPE LINES

- A. Low pressure air testing shall be performed on all sewer lines less than 42-inches in diameter. For ductile iron and steel pipe, test in accordance with the applicable

requirements of ASTM C924. For PVC and glass-reinforced plastic pipe, test in accordance with applicable requirements of ASTM F1417 and UBPPA UNI-B-6.

- B. Prior to testing, all pipes and service laterals shall be cleaned of debris, then plugged and braced with plugs appropriate for the test pressure. Adequate bracing shall be furnished by the Contractor to brace plug for the resultant force on plug when being tested.
- C. Due to the dangers in air testing of lines, no one will be allowed in or around the manholes where test plugs are installed during pressurization, testing, and depressurization. Pressure in the pipe shall be completely relieved before any plug is loosened for removal.
- D. Manufactures shall be consulted for maximum test pressures for pipe and appurtenances greater than 30-inch in diameter.
- E. Contractor shall furnish all equipment necessary for the air test including, but not limited to, the following:
 - 1. Two calibrated 2-inch pressure gauges with a range from 0 to 10 psi with divisions of 0.10 psi and accuracy of ± 0.04 psi. Gauges shall be capable of being read at a location remote from the line being tested.
 - 2. Rotameter with standard CFM reading and accuracy of $\pm 2\%$.
 - 3. Test plugs for the pipe line(s) being tested. Plugs shall be in good condition and rated for the test pressure force. Resultant force anticipated on the plug shall be calculated by the following formula:

$$\text{Force (lbf)} = (\text{Area of Pipe, ft}^2)(\text{Test pressure, psi}) (144, \text{ in}^2/\text{ft}^2)$$

- 4. An air compressor capable of pressurizing the pipe within a reasonable amount of time. Air compressor shall provide an oil-free air source and shall have a shut-off valve, pressure regulating valve, 9 psig pressure relief valve, input pressure gauge, and a continuous monitoring pressure gauge with a range from 0 to 10 psi with divisions of 0.10 psi and accuracy of ± 0.04 psi.
- F. Test Procedure:
- 1. Determine required test time using Table 1 at the end of this Section or using the following equation:

Calculate Test Time (T) for a single pipe:

$$T = 0.085 DK/Q$$

Where:

T = minimum time allowed for an air pressure drop of 1.0 psig, seconds,

K = 0.000419 DL but not less than 1.0,

Q = leak rate in CFM/SF = 0.0015 CFM/SF

D = inside diameter, in.

L = length of test section, ft.

Example:

Find the test time (T) for 400 LF of 30-inch diameter pipe.

$$T = 0.085 D[K/Q]$$

$$T = 0.085 (30) \{((0.000419)(30)(400))/0.0015\}$$

$$T = 0.085 (30) (3352)$$

$$T = 8.547 \text{ seconds,} = 142.46 \text{ minutes (142 minutes and 28 seconds)} =$$

$$2.37 \text{ hour (2 hours and 22 minutes and 28 seconds).}$$

In order to reduce test time, use 0.5 psi drop. Find the test time of the 0.5 psi drop:

$$T/2 = 2.37 \text{ hrs}/2 = 1.185 \text{ (1 hour and eleven minutes and 14 seconds).}$$

2. Prior to placement of plugs Contractor shall make a visual inspection of the pipe adjacent to the manhole to detect any evidence of shear in the pipe near the manhole.
3. Slowly fill the test section to line to a Fill Pressure of 4 psig greater than the average back pressure of any groundwater above top of pipe. If groundwater is above the pipe then the average depth of groundwater for the section being tested must be determined. Since water produces a pressure of 0.43 psi per foot of depth, air pressures must be increased to offset the depth of ground water over the pipe however Test Pressure is limited to a maximum of 9 psig, for water bearing soils. If ground water is in excess of 12 feet above top of pipe, or if air pressure required for the test is greater than 9 psi gauge, the air test method shall not be used. The groundwater level shall be lowered by pumping or dewatering unless otherwise approved by the Engineer.

Example:

Find fill pressure and test pressure if an average groundwater is 5 feet above pipe.

$$\text{Fill Pressure} = 4.0 \text{ psi} + (5 \times .43) \text{ psi} = 6.15 \text{ psi}$$

$$\text{Test Pressure} = 3.5 \text{ psi} + (5 \times .43) \text{ psi} = 5.65 \text{ psi}$$

4. Regulate air supply to maintain a pressure between 3.5 and 4.0 psig (plus groundwater psi) for a minimum of two minutes.
5. Once air pressure has stabilized, determine the rate of air loss by the Time-Pressure Drop Method.
 - i. Once air pressure has stabilized, disconnect air supply and allow pressure to drop to Test Pressure of 3.5 psig (plus groundwater psi).
 - ii. Determine the time required for the pressure to drop 1 psig (i.e., from 3.5 psig to 2.5 psig). Long sections or large diameter pipe can utilize a timed-pressure drop of 0.5 psig, and required test times shall be exactly one-half the time required for the 1.0 psig test.
 - iii. If the pressure drops more than 1.0 psig before the required test time has elapsed, the line has failed the test. Once leak is repaired, retest line. If the pressure drops less than 1.0 psig when the required test time has elapsed, the pipe is acceptable. It is not necessary to hold the test for the entire period of time if it is evident that the rate of air loss is zero or less than the allowable, and is approved by the Owner/Engineer.

- iv. Once the test is completed, allow all air to escape prior to removing plugs.

3.10 DEFLECTION TEST

- A. Within thirty (30) days after final backfill installation, each section of non-ferrous pipe shall be checked for vertical deflection using an electronic deflecto-meter or a rigid "Go-No-Go" device. Vertical deflection shall not exceed five (5) percent of the inside pipe diameter for non-ferrous pipe.
- B. Where the actual deflection exceeds the allowable, the Contractor shall discover the cause and correct it before the pipe will be acceptable. For the purpose of this section, a section of sewer is defined as that length of sewer between successive manholes or special structures or stubouts for future connections.

3.11 JOINT TESTING

- A. Gravity sewer mains 42" and larger in diameter shall be joint tested unless otherwise approved by the Engineer. The pressures required to seal the end element tubes shall be as specified by the manufacturer of the testing apparatus. The line for pressurizing the void volume shall include a 6 psi pressure relief valve to reduce hazards and avoid over-pressurization.
- B. Tests shall be performed in accordance with the most current version of ASTM C 1103 (Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines), regardless of pipe material, and as modified below. Test pressure shall be measured by gauges furnished and installed by the Contractor a safe distance away from the test joint, the testing equipment, and the air supply. A minimum of two pressure gauges shall be installed at separate locations along the test line. The Contractor shall furnish all test equipment as required.
- C. The Contractor shall test joints of installed sewer pipe, regardless of pipe material, with air to demonstrate the integrity of the joint. Joints shall be tested after backfilling, and without any groundwater effect. Assuming the backfilling operations has covered approximately one-half the last joint of pipe installed, the joint to be tested shall be the third joint from the open bell of the last joint installed. Before the joint test, all joints shall be tested with a feeler gauge supplied by the pipe manufacturer to determine if the joint gasket has been properly seated.
- D. The Contractor shall apply all necessary prep material required for the interior of the pipe barrel a minimum distance of 6" from each end of the pipe to facilitate testing.
- E. All joint testing equipment (including an air compressor and hose) shall be furnished by the Contractor and shall be as manufactured by Cherne Industries Incorporated, or approved equal. The joint tester end element sealing tubes (when inflated) shall create an airtight seal over the joint of the pipe. Inflate end element sealing tubes with air in accordance with the equipment manufacturer's instructions.
- F. The center cavity between the end elements shall be pressurized with air to 4 psi. Pumps, dewatering equipment, or wellpoint systems (provided by the Contractor) shall be used to maintain the groundwater elevation a minimum of 6 inches below the bottom of the pipe.

- G. If the pressure in the cavity holds or drops less than 1 psi in 5 seconds, the pipe joint shall be found to be acceptable. If the pressure drop is greater 1 psi in 5 seconds, the joint is defective and shall be disassembled and remade or repaired and then retested by the Contractor.
- H. Testing of pipe joints shall be performed immediately after installing and backfilling the next pipe section. The Contractor shall keep a log of all tests performed documenting the following:
1. Joint number from specific numbered manholes
 2. Date and time
 3. Name of test operator
 4. Sealing pressure used
 5. Joint test pressure used
 6. Number of seconds joint held pressure to 1 psi drop
 7. Whether joint passed or failed
 8. Action taken if failure occurred, including retesting

- END OF SECTION -

SECTION 15006

DUCTILE IRON PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. All ductile iron pipe and specials shall be marked with the manufacturer's name or trademark, size, weight, thickness class, the date of manufacture, and the word "Ductile".
- B. Ductile iron pipe (DIP) of the sizes shown or specified shall conform to ANSI A21.51 (AWWA C151), Grade 60-42-10 for ductile iron pipe centrifugally cast in metal molds or sand-lined molds. All ductile iron pipe shall conform to ANSI A21.50 (AWWA C150) for thickness design and shall be supplied in 18 or 20 foot nominal lengths or as required to meet the requirements of the Drawings. Fittings and specials shall be cast iron or ductile iron conforming to the requirements of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) and shall have a minimum rated working pressure of 250 psi.
- C. Reference Sections 15000 and 15390.
- D. Ductile iron piping is required as shown on the Drawings and as specified in Section 15390. All ductile iron piping shall be provided with an interior ceramic epoxy lining as specified in Paragraph 2.02.A. Where indicated on the Drawings, the ductile iron piping shall be provided with an exterior polyethylene encasement (Polywrap) as specified in Paragraph 2.02.B.2. The exterior of all ductile iron pipe and fittings shall be coated with a bituminous topcoat as specified in Paragraph 2.02.B.1.

1.02 SUBMITTALS

- A. Shop Drawings
 - 1. Reference Sections 01300 and 15000.
 - 2. Certification of factory hydrostatic testing.
 - 3. Manufacturers product data with sizes and classes indicated.

PART 2 -- PRODUCT

2.01 ACCEPTABLE MANUFACTURERS

- A. DIP manufacturer's requirements:
 - 1. The manufacturer shall have a minimum of ten (10) years experience successfully manufacturing and furnishing all sizes of pipe fittings and joint types involved on this project.
 - 2. The pipe manufacturer shall provide both the pipe and fittings.

3. All pipe, restraining devices, and accessories specified in this section shall be manufactured in the United States of America. Foreign fittings manufactured by Sigma Corporation or Star Pipe Products may be used for pipe fittings 24-inches and smaller.

- B. Subject to compliance with the Contract Documents the following manufacturers are acceptable: American Cast Iron Pipe, US Pipe, and McWane Ductile.

2.02 DUCTILE IRON PIPE AND FITTINGS

A. Interior Linings (Sanitary Sewer Lines)

1. All ductile iron gravity sewer pipe and fittings shall be lined with either Protecto 401 ceramic epoxy lining as manufactured by Induron, Permox-CTF as manufactured by the Permite Corporation, or approved equal.

The lining shall be applied by a certified firm with a successful history of applying linings to the interior of ductile iron pipe and fittings. The ceramic epoxy lining shall cover the inner surface of the pipe as follows:

- a. Coating of bell sockets and spigot ends require the gasket area and spigot ends up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum.
- b. The joint compound shall be applied by brush to ensure coverage. Care should be taken that the joint compound is smooth without excess buildup in the gasket seat or on the spigot ends.
- c. Coating of the gasket seat and spigot ends shall be done after the application of the lining. The lining shall extend from the spigot end through the socket to the edge of the gasket sealing area.
- d. The lining in fittings shall cover the interior surfaces including the socket areas as defined above.
- e. The lining in pipe and fittings shall be 40 mils nominal thickness.
- f. Repair procedures for damaged ceramic epoxy lining shall be made in strict accordance with the manufacturer's recommendations.
- g. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.
 - i. A permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.
 - ii. The following test must be run on coupons from factory lined ductile iron pipe:
 - o ASTM B-117 Salt Spray (scribed panel) – Results to equal 0.00 undercutting after two years.
 - o ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F. Results to equal no more than 0.5 mm undercutting after 30 days.
 - o Immersion Testing rated using ASTM D-714.87.
- 20% Sulfuric Acid – No effect after two years.

- 140°F 25% Sodium Hydroxide – No effect after two years.
 - 160°F Distilled Water – No effect after two years.
 - 120°F Tap Water (scribed panel)
 - 0.0 undercutting after two years with no effect.
- o An abrasion resistance of no more than 3 mils (.075mm) loss after one million cycles using European Standard EN 598: 1994 Section 7.8 Abrasion Resistance.”

B. Exterior Coatings

1. All pipe and fittings shall have a bituminous topcoat applied in accordance with ANSI A21.15 (AWWA C151).
2. Where indicated on the Drawings, pipe and fittings shall be wrapped with either V-Bio polyethylene encasement (Polywrap) containing anti-microbial biocide, VB3 Polywrap manufactured by AA Threadseal, or approved equal. Polyethylene encasement shall conform to ANSI/AWWA C105/A21.5. Polyethylene encasement shall be provided in tube rolls, accordion bundles, or sheets, and shall be manufactured of virgin polyethylene material conforming to ASTM A674. Polywrap shall consist of three layers of co-extruded linear low density polyethylene (LLDPE) film. The specified nominal thickness is 0.008 in. (8 mils). Joints in the Polywrap encasement shall be taped. Installation of Polywrap encasement shall conform to ANSI/AWWA C105/A21.5 and DIPRA's "Polyethylene Encasement" brochure.

C. Pipe and fittings shall be the class that equals or exceeds the pipe class as specified in Section 15390. Requirements for various types of joints are described in the following paragraphs.

D. Push-on joint includes a single rubber gasket which fits into the bell end of the pipe. The gasket shall be wiped clean, flexed, and then placed in the socket. Any bulges in the gasket which might interfere with the entry of the plain end of the pipe shall be removed. A thin film of lubricant shall be applied to the gasket surface which will come into contact with the spigot end of the pipe. The lubricant shall be furnished by the pipe manufacturer.

The plain end of the pipe, which is tapered for ease of assembly, shall be wiped clean and a thick film of lubricant applied to the outside. The pipe shall be aligned and carefully entered into the socket until it just makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be pulled “home” with an approved jack assembly as recommended by the pipe manufacturer. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.

All joints and joint accessories shall conform to the requirements of ANSI A21.11 (AWWA C111).

E. Gaskets shall be the "Ring Gasket" type, 1/8-inch minimum thickness, cloth inserted rubber, red rubber or neoprene and shall be suitable for the service intended. Bolts shall be of the size and length called for and in accordance with the "American Standard" and comply with the requirements of the ANSI/AWWA Standards. The bolts for flanged joints shall be a

minimum ASTM A307; Grade B carbon steel and be in accordance with ANSI A21.10, (AWWA C110). The bolts shall have hexagonal heads and nuts, no washers shall be used.

- F. Bell and spigot pipe shall be provided with push on, O-ring rubber gasket, compression type joints and shall conform to the requirements of ANSI A21.11 (AWWA C111). Fittings and specials shall be supplied with mechanical joints as specified for mechanical joint pipe. If required by installation conditions, pipe shall have cast-on lugs for adequately tying it together.
- G. Restrained joint pipe and fittings shall consist of bolted retainer rings, ductile iron locking segments held in place by rubber retainers, or ductile iron retaining rings that lock over the bell of the joint and are secured to prevent rotation, and factory welded retainer beads or rings on the spigot of the pipe. All components of the bolted or snap ring assemblies shall be constructed of corrosion-resistant, high strength, low-alloy steel. Restrained pipe and fittings shall be Flex-Ring or Lok-Ring type joints as manufactured by American Cast Iron Pipe Company, TR Flex as manufactured by US Pipe, and TR Flex as manufactured by McWane Ductile. Fittings 12" and smaller may be mechanical joint with EBAA Mega-Lug or equal. No field fabrication of push-on or other type pipe joints to furnish restrained joints shall be allowed unless specifically approved by the Engineer. Special gripping gaskets in lieu of welded ring-type restrained joints shall not be permitted on this project.

2.02 SOURCE QUALITY CONTROL

A. Factory Test:

- 1. Subject pipe to factory hydrostatic test of not less than 500 psi for minimum 10 seconds.

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Push-on joints shall be provided at locations as indicated on the Drawings. Pipe shall be installed in accordance with the Ductile Iron Pipe Installation Guide published by the Ductile Iron Pipe Research Association (DIPRA). The gasket shall be wiped clean, flexed and then placed in the socket. Any bulges in the gasket, which might interfere with the entry of the plain end of the pipe shall be removed. A thin film of lubricant shall be applied to the gasket surface, which will come into contact with the spigot end of the pipe. The lubricant shall be furnished by the pipe manufacturer. The plain end of the pipe, which is tapered for ease of assembly, shall be wiped clean and a thick film of lubricant applied to the outside. The pipe shall be aligned and carefully entered into the socket until it just makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be pulled "home" with an approved jack assembly as recommended by the pipe manufacturer. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.
- B. Restrained joints shall be provided at all road and stream crossings. Restrained joints shall be made up similar to that for push-on joints. Restrained pipe and fittings shall consist of either bolted retainer rings and welded retainer bars or the boltless type which includes

ductile iron locking segments and rubber or neoprene retainers. Bolts for restrained joints (if applicable) shall be as recommended by the manufacturer.

C. Cutting:

1. Do not damage interior lining material during cutting.
2. Use abrasive wheel cutters or saws.
3. Make square cuts.
4. Bevel and free cut ends of sharp edges after cutting.

D. Support exposed pipe in accordance with Section 15000.

E. Install buried piping in accordance with Section 15000.

3.02 FIELD QUALITY CONTROL

A. Test piping systems in accordance with Section 15000.

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SECTION 15008

PVC SOLID WALL GRAVITY SEWER PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Polyvinyl Chloride (PVC) solid wall pipe shall conform to the following minimum requirements:

1. Materials – ASTM D3034
2. Dimension Ratio/Pipe Stiffness – SDR 26/115 psi
3. Lay Length – 20-feet
4. Pipe Compound – Cell Class 12454 as defined by ASTM D1784
5. Pipe Joint Standard – ASTM D3212
6. Gasket Standard – ASTM F477
7. Gasket Material – Styrene Butadiene Rubber (SBR)
8. Installation Standard – ASTM D2321

B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. JM Eagle
2. North American Pipe
3. Diamond Plastics

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Reference Section 15000, Basic Mechanical Requirements.
- B. Reference Section 15390, Schedules

PART 2 -- PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) SOLID WALL GRAVITY SEWER PIPE AND FITTINGS WITH ELASTOMERIC SEAL JOINTS FOR 8-INCH THROUGH 24-INCH

A. All pipe and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects that may affect the wall integrity. The pipe shall

be uniform as commercially practical in color, opacity, density and other physical properties.

- B. Gasketed Joint – The integral bell gasketed joint shall be designed so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a water-tight seal. All joint surfaces upon which the gasket may bear shall be smooth and free of imperfections, ridges, fractures, and cracks. All joints shall show no signs of leakage when tested in accordance with ASTM D 3212.
- C. Gaskets shall be elastomeric gaskets and shall comply with the requirements described in ASTM F 477. Gasket shall be molded into a circular form or extruded to the proper section and then spliced into circular form. The lubricant for gaskets shall be furnished by the pipe manufacturer and shall have no detrimental effect on the gasket or on the pipe or fitting.

The plain end and the spigot ends of the pipe shall be wiped clean and a thick film of lubricant applied to the outside of the spigot end. The pipe shall be aligned and carefully entered into the socket until it makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be pulled “home” by the approved method recommended by the pipe manufacturer. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.

- D. Flattening testing of the pipe shall require three specimens of pipe, each 6-inches in length, between parallel plates in a suitable press until the distance between the plates is 40% of the outside diameter of the pipe. The rate of loading shall be uniform and such that the compression is complete within 2 to 5 minutes. The specimen shall pass if no splitting, cracking, or breaking is observed under normal light with the unaided eye.
- E. Pipe bedding shall be as shown on the Contract Drawings.
- F. Pipe deflection shall comply with ASTM D 2412 so as not to exceed the maximum allowable deflection.
- G. Pipe certification shall be furnished by the manufacturer that the manufacturing of the pipe is in accordance with ASTM Reference Standards listed in the specifications, and that the pipe passes the “flattening testing” as specified in Paragraph D. above.

PART 3 -- EXECUTION, INSTALLATION AND TESTING

3.01 INSTALLATION OF PVC SOLID WALL GRAVITY SEWER PIPE

- A. Installation of PVC solid wall gravity sewer pipe shall be installed in accordance with Section 15000 requirements for installation, testing and flushing of pipe.

- END OF SECTION -

SECTION 15390

SCHEDULES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

- A. Reference Sections 15000, 15006, and 15008.

1.02 PIPING SYSTEM SCHEDULES

- A. Piping requirements for this Section are outlined on the Drawings, in Division 15, and in the Piping System Schedule illustrated below. Piping systems shall be in accordance with the schedules below unless otherwise indicated on the Drawings.

PIPING SYSTEM SCHEDULE
WEST FORK INTERCEPTOR

PIPE IDENTIFICATION	NOMINAL PIPE SIZE	MATERIAL	TYPE OF JOINT	CLASS/DESIGN	TEST PRESSURE
GRAVITY SEWER	8-24 INCHES	PVC SOLID WALL DUCTILE IRON	PUSH-ON	SDR 26/115 PSI PRESSURE CLASS 350 WITH PROTECTIVE LINING	REFER TO SECTION 15000
GRAVITY SEWER AT SUBMERGED STREAM CROSSINGS	8-24 INCHES	DUCTILE IRON	RESTRAINED JOINT ¹ .	PRESSURE CLASS 350 WITH PROTECTIVE LINING AND POLYWRAP	REFER TO SECTION 15000
GRAVITY SEWER AT ROADWAY CROSSINGS	8-24 INCHES	DUCTILE IRON	RESTRAINED JOINT ¹ .	PRESSURE CLASS 350 WITH PROTECTIVE LINING	REFER TO SECTION 15000

1. Restrained joint piping shall be provided at all roadway crossings, submerged stream crossings, and as shown on the Drawings.

- END OF SECTION -

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APPENDIX A

The permits as delineated below and contained within this Appendix A, shall be considered a part of this Contract and fully complied with by the General Contractor.

- US Army Corps of Engineers Nationwide Permit 12
- NCDEQ Sedimentation and Erosion Control Permit
- NCDOT Encroachment Contract
- NCDOT Driveway Permit
- NCDEQ 401 Water Quality Certification
- Duke Energy Transmission Conditional Approval Letter
- Duke Energy Extended LONO
- NCDEQ Fast-Track Wastewater Collection Permit
- Weddington Flood Study Permit

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US Army Corps of Engineers Nationwide Permit 12

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. SAW-2018-01351 County: Union U.S.G.S. Quad: NC-Matthews

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Permittee: Union County Public Works Department
John Shutak
Address: 500 North Main Street
Monroe, NC 28112
Telephone Number: 704-283-3651
E-mail: john.shutak@unioncountync.gov

Size (acres)	<u>25</u>	Nearest Town	<u>Matthews</u>
Nearest Waterway	<u>West Fork Twelvemile Creek</u>	River Basin	<u>Santee</u>
USGS HUC	<u>03050103</u>	Coordinates	Latitude: <u>35.027028</u> Longitude: <u>-80.706443</u>

Location description: The review area consists of an approximately 4.8-mile long utility corridor which parallels West Fork Twelve Mile Creek south from east of the eastern terminus of Camrose Crossing to a point immediately north of Weddington Road.

Description of projects area and activity: This verification authorizes the permanent wetland conversion impacts of 0.08 acres and permanent stream impacts of 120 linear feet (embedded riprap crossings) along with temporary wetland and stream impacts of 0.146 acres and 504 linear feet, respectively, to facilitate the development of a new gravity sewer utility line to serve existing and future residential developments. All temporary stream and wetland impacts will be restored to pre-existing conditions after the completion of construction.

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 3/9/2021, and the enclosed plans Impact Map, 1-19 dated 2/16/2021. 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 **Morehead City, NC, at (252) 808-2808.**

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 **Bryan Roden-Reynolds at 704-510-1440 or bryan.roden-reynolds@usace.army.mil.**



Bryan Roden-Reynolds
2021.03.26 13:45:14 -04'00'

Date: **3/26/2021**

Corps Regulatory Official: _____

Expiration Date of Verification: **03/18/2022**

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: **Hazen and Sawyer**
Linda Diebolt
Address: **4011 West Chase Boulevard**
Raleigh, NC 27607
Telephone Number: **919-906-1775**
E-mail: **ldiebolt@hazenandsawyer.com**

SPECIAL CONDITIONS

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.

Action ID Number: SAW-2018-01351 County: Union

Permittee: Union County Public Works Department, John Shutak

Project Name: West Fork Twelve-Mile Creek Interceptor

Date Verification Issued: 3/26/2021

Project Manager: Bryan Roden-Reynolds

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: Bryan Roden-Reynolds
Charlotte Regulatory Office
U.S Army Corps of Engineers
8430 University Executive Park Drive, Suite 615
Charlotte, North Carolina 28262
or
bryan.roden-reynolds@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

MEMORANDUM FOR RECORD

SUBJECT: Department of the Army Memorandum Documenting General Permit Verification

- 1.0 Introduction and overview:** Information about the proposal subject to one or more of the Corps regulatory authorities is provided in Section 1, detailed evaluation of the activity is found in Sections 2 through 4 and findings are documented in Section 5 of this memorandum. Further, summary information about the activity including administrative history of actions taken during project evaluation is attached (ORM2 summary).
- 1.1 Applicant name: **Union County Public Works Department, John Shutak**
- 1.2 Activity location: Latitude: **35.027028** Longitude: **-80.706443** Location description: **The review area consists of an approximately 4.8-mile long utility corridor which parallels West Fork Twelve Mile Creek south from east of the eastern terminus of Camrose Crossing to a point immediately north of Weddington Road.**
- 1.3 Description of activity requiring verification: **This verification would authorize the permanent wetland conversion impacts of 0.08 acres and permanent stream impacts of 120 linear feet (embedded riprap crossings) along with temporary wetland and stream impacts of 0.146 acres and 504 linear feet, respectively, to facilitate the development of a new gravity sewer utility line to serve existing and future residential developments. All temporary stream and wetland impacts will be restored to pre-existing conditions after the completion of construction.**
- 1.4 Is this an After-the-Fact verification? **No.**
- 1.5 Date PCN determined complete for processing: **3/15/2021**
- 1.6 Jurisdiction Determination completed? **A Preliminary JD was completed on 3/16/2021.**
- 1.7 Permit authority: **Section 404 of the Clean Water Act (33 USC 1344)**
- 1.8 Applicable Permit: **NWP 12. Utility Line Activities**
- 1.9 Activity requires written waiver of NWP limits? **No.**
- 1.10 Activity requires a waiver from the requirements of a regional condition(s)? **No.**
- 2.0 Evaluation of the Pre-Construction Notification**
- 2.1 Direct and indirect effects caused by the GP activity: **The direct effects of the proposed activity in waters would include the loss of jurisdictional waters (as specified in Section 1.3) and their associated aquatic resource functions. The proposed activity also has the potential to result in indirect effects to waters including excess sedimentation in downstream waters, disruption and/or killing of aquatic life in the direct vicinity of the project area, increase of downstream flows, and blocking/restricting aquatic life passage transiting in and through the project area. These indirect effects are expected to be minimal due to design criteria and Best Management Practices (BMPs) required by Nationwide Permit General and Regional Conditions. Additionally, indirect effects would**

SAW-2018-01351

be further reduced through the implementation of BMPs required by state, local, and Federal ordinances and regulations.

2.2 Site specific factors: **The review area consists mostly of wooded, undeveloped areas.**

2.3 Coordination

2.3.1 Was the PCN coordinated with other agencies? **No.**

Agency coordination is not required and was not conducted for the proposed project.

2.3.2 Was the PCN coordinated with other Corps offices? **No.**

2.4 Mitigation

2.4.1 Provide brief description of how the activity has been designed on-site 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: **The applicant provided a detailed statement describing their efforts to avoid and minimized impacts to waters of the United States on the project site in the preconstruction notification. Based on this information, the Corps believes the applicant has avoid and minimized impacts to waters of the United State to the maximum extent practicable.**

2.4.2 Is compensatory mitigation required for unavoidable impacts to jurisdictional aquatic resources to reduce the individual and cumulative adverse environmental effects to a minimal level? **Yes.**

Provide rationale: **Compensatory mitigation is required to ensure minimal adverse environmental effects. The project area is located within the Lower Catawba watershed (HUC 03050103) which is highly urban. This area has a long history of intensive land uses which has resulted in long term degradation to aquatic resources. The watershed has rapidly converted to developed area and impervious surfaces since the 1970's due to the rapid expansion of the Charlotte metropolitan area. The National Land Cover Dataset estimated that 7.697% of the watershed (HUC 03050103) consisted of impervious surfaces in 2011. This is expected to be 8.5-9% today based on the pace of development in this watershed since 2011. Scientific literature cited by the USEPA Office of Water Recovery in their 09/01/2011 dated Recovery Potential Metrics Summary Form for watershed percent impervious cover suggests that these levels of impervious surfaces cause substantial physical, chemical, and biological harm to the aquatic environment. Additionally, there are currently no private mitigation banks or in-lieu fee sites with credits available to offset losses of aquatic function from private development in this watershed. Given the quality of the waters to be impacted, the scarcity of similar resources in this watershed, and the largely urban nature of the watershed, the waters within the project area provide important aquatic resource functions to downstream waters that are difficult to replace. The loss of these functions in this setting and in the proposed quantities necessitates compensatory mitigation to ensure that cumulative impacts to onsite and downstream aquatic resources are individually and cumulatively minimal.**

2.4.3 Type and location of compensatory mitigation

SAW-2018-01351

Is the impact in the service area of an approved mitigation bank? **Yes.**

If yes, does the mitigation bank have appropriate number and resource type of credits available? **No.**

Is the impact in the service area of an approved in-lieu fee program? **Yes.**

If yes, does the in-lieu fee program have the appropriate number and resource type of credits available? **Yes.**

Selected compensatory mitigation type/location(s): See Table 1

Table 1: Mitigation Type and Location	
Mitigation bank credits	
In-lieu fee program credits	X
Permittee-responsible mitigation under a watershed approach	
Permittee-responsible mitigation, on-site and in-kind	
Permittee-responsible mitigation, off-site and/or out of kind	

Does the selected compensatory mitigation option deviate from the order of the options presented in §332.3(b)(2)-(6)? **N/A.**

If yes, provide the rationale for the deviation, including the likelihood for ecological success and sustainability, location of the compensation site relative to the impact site and their significance within the watershed, and/or the costs of the compensatory mitigation project (see 33 CFR §332.3(a)(1)):

2.4.4 Amount of compensatory mitigation: 0.16 acres of wetland credit

Rationale for required compensatory mitigation amount: **This amount of compensatory mitigation is required because the mitigation site is located in a different watershed/8 digit HUC than the impacted aquatic resources. The project proposes to permanently convert 0.08 acres of forested wetlands to emergent wetlands. While conversion of wetlands does not result in a loss of waters, the Corps still considers wetland conversion impacts as adverse environmental impacts and requires compensatory mitigation to offset these impacts. The compensatory mitigation ratio for the 0.08 acres of wetland conversion impacts is determined at 1:1. In addition, the impacts are located in the Expanded Service Area which would necessitate the need to double the compensatory mitigation ratio due to the lack of available credits in the watershed (required ratio 2:1)**

3.0 Compliance with Other Laws, Policies and Requirements

3.1 Section 7(a)(2) of the Endangered Species Act (ESA)

3.1.1 ESA action area: The action area includes the waters of the United States that will be directly affected by the proposed work or structures and uplands directly affected as a result of authorizing the work or structures.

SAW-2018-01351

- 3.1.2 Has another federal agency taken steps to document compliance with Section 7 of the ESA and completed consultation(s) as required? **No.**
- 3.1.3 Known species/critical habitat present? **No. The Corps has determined that it has fulfilled its responsibilities under Section 7(a)(2) of the ESA.**
IPAC Species in Union County:
NAME: Carolina Heelsplitter (Lasmigona decorata) STATUS: Endangered
NAME: Michaux's sumac (Rhus michauxii) STATUS: Endangered
NAME: Schweinitz's sunflower (Helianthus schweinitzii) STATUS: Endangered
- Effect determination(s), including no effect, for all known species/habitat, and basis for determination(s): **Based on the latest version of the Natural Heritage Program's NHEO data, there are no protected species located within or in the vicinity of the action area. The Corps has determined the proposed activity will not directly or indirectly affect any species subject to the ESA.**
- 3.1.4 Consultation with either the National Marine Fisheries Service and/or the U.S. Fish and Wildlife Service was initiated and completed as required, for any determinations other than "no effect" (see the attached "Summary" sheet for begin date, end date and closure method of the consultation). Based on a review of the information above, the Corps has determined that it has fulfilled its responsibilities under Section 7(a)(2) of the ESA.
- 3.2 **Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat (EFH) The NWPs/RGPs were coordinated with the NMFS during the permit renewal process. NMFS coordination/EFH consultation is required if the activity affects SAV. This activity does not affect SAV. Therefore, NMFS coordination/EFH consultation has been completed.**
- 3.2.1 Has another federal agency taken steps to comply with EFH provisions of Magnuson-Stevens Act? **No.**
- 3.2.2 Did the proposed project require review under the Magnuson-Stevens Act? **No.**
- 3.3 **Section 106 of the National Historic Preservation Act (Section 106)**
- 3.3.1 Section 106 permit area: The permit area includes those areas comprising waters of the United States that will be directly affected by the proposed work or structures, **as well as activities outside of waters of the U.S. because all three tests identified in 33 CFR 325, Appendix C(g)(1) have been met.**
- Final description of the permit area: **All three test have been met and portions of the larger project undertaken outside of waters of the U.S. are in the permit area.**
- 3.3.2 Has another federal agency taken steps to comply with Section 106 of the National Historic Preservation Act and completed consultation(s) as required? **No.**
- 3.3.3 Known cultural resource sites present and/or survey or other additional information needed? **No. Based on the NCDCCR "HPOWEB" service and aerial photographs, there are no known historic properties located in the permit area or in close proximity to the permit area.**

SAW-2018-01351

Effect determination and basis for that determination: **The Corps has determined the proposed activity will have no effect on properties listed or eligible for listing in the National Register of Historic Places. This activity is so limited in nature and scope that there is little likelihood of impinging upon a historic property even if such properties were present within the affected area(s).**

3.3.4 Consultation was initiated and completed as required with the appropriate agencies, tribes and/or other parties for any determinations other than “no potential to cause effects” (see the attached “Summary” sheet for consultation type, begin date, end date and closure method of the consultation). The Corps has determined that it has fulfilled its responsibilities under Section 106 of the NHPA.

3.4 Tribal Trust Responsibilities

3.4.1 Was government-to-government consultation conducted with Federally-recognized Tribe(s)? **No. There are no known tribal interests in the project area.**

Provide a description of any consultation(s) conducted including results and how concerns about significant effects to protected tribal resources, tribal rights and/or Indian lands were addressed. The Corps has determined that it has fulfilled its tribal trust responsibilities.

3.4.2 Other Tribal including any discussion of Tribal Treaty rights? **Select Yes or No.**

3.5 Section 401 of the Clean Water Act – Water Quality Certification (WQC)

3.5.1 Is a Section 401 WQC required, and if so, has the certification been issued or waived? **A general WQC has been issued for this permit.**

3.6 Coastal Zone Management Act (CZMA)

3.6.1 Is a CZMA consistency concurrence required, and if so, has the concurrence been issued, waived or presumed? **N/A, a CZMA consistency concurrence is not required.**

3.7 Wild and Scenic Rivers Act

3.7.1 Is the project located 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? **No. According to <http://www.rivers.gov>, the proposed project area is not within a designated or study river.**

3.8 Effects on Corps Civil Works Projects (33 USC 408)

3.8.1 Does the applicant also require permission under Section 14 of the Rivers and Harbors Act (33 USC 408) because the activity, in whole or in part, would alter, occupy, or use a Corps Civil Works project? **No, there are no Corps Civil Works project(s) in or near the vicinity of the proposal.**

4.0 Special Conditions

4.1 Are special conditions required to ensure minimal effects, protect the public interest and/or ensure compliance of the activity with any of the laws above? **Yes.**

4.2 Required special condition(s)

Special condition:

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.

Rationale: **See Section 2.4.2.**

5.0 Determination

5.1 Waiver request conclusion, if required or select N/A: N/A.

5.2 The **activity, with the required mitigation**, will result in no more than minimal individual and cumulative adverse effects on the aquatic environment and will not be contrary to the public interest, **provided the permittee complies with the special conditions identified above.**

5.3 This activity, as described, complies with all terms and conditions of the permit identified in Section 1.5.

PREPARED BY:



Bryan Roden-Reynolds
2021.03.26 13:44:47
-04'00'

Date: 3/26/2021

Bryan Roden-Reynolds

Compensatory Mitigation Responsibility Transfer Form

Permittee: Union County Public Works Department, John Shutak
Project Name: West Fork Twelve-Mile Creek Interceptor

Action ID: SAW-2018-01351
County: Union

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: 03050103, Catawba River Basin			
Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
			0.08			

*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: 03050103 Expanded Service Area			
Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
			0.16			

Mitigation Site Debited: NCDMS
 (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: _____

Name of Sponsor's Authorized Representative: _____

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 NCDMS, confirming they are willing and able to accept the applicant's compensatory mitigation responsibility, dated 3/22/2021 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: Bryan Roden-Reynolds
USACE Field Office: Charlotte Regulatory Office
US Army Corps of Engineers
8430 University Executive Park Drive, Suite 615
Charlotte, North Carolina 28262
Email: bryan.roden-reynolds@usace.army.mil



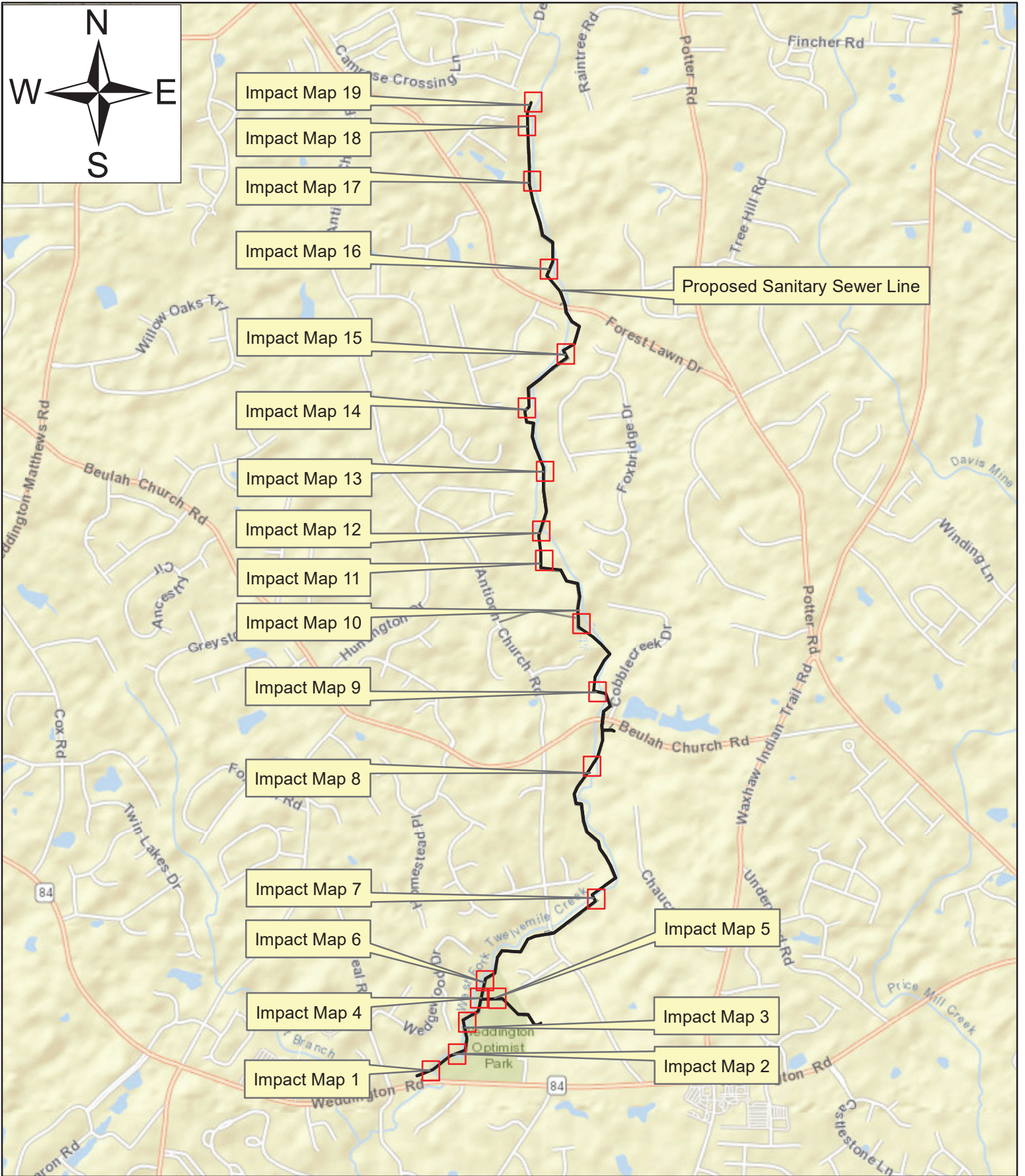
Bryan Roden-Reynolds
2021.03.26 13:43:57 -04'00'

USACE Project Manager Signature

3/26/2021

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>



Date: 2/16/2021

1 inch equals 3,000 feet










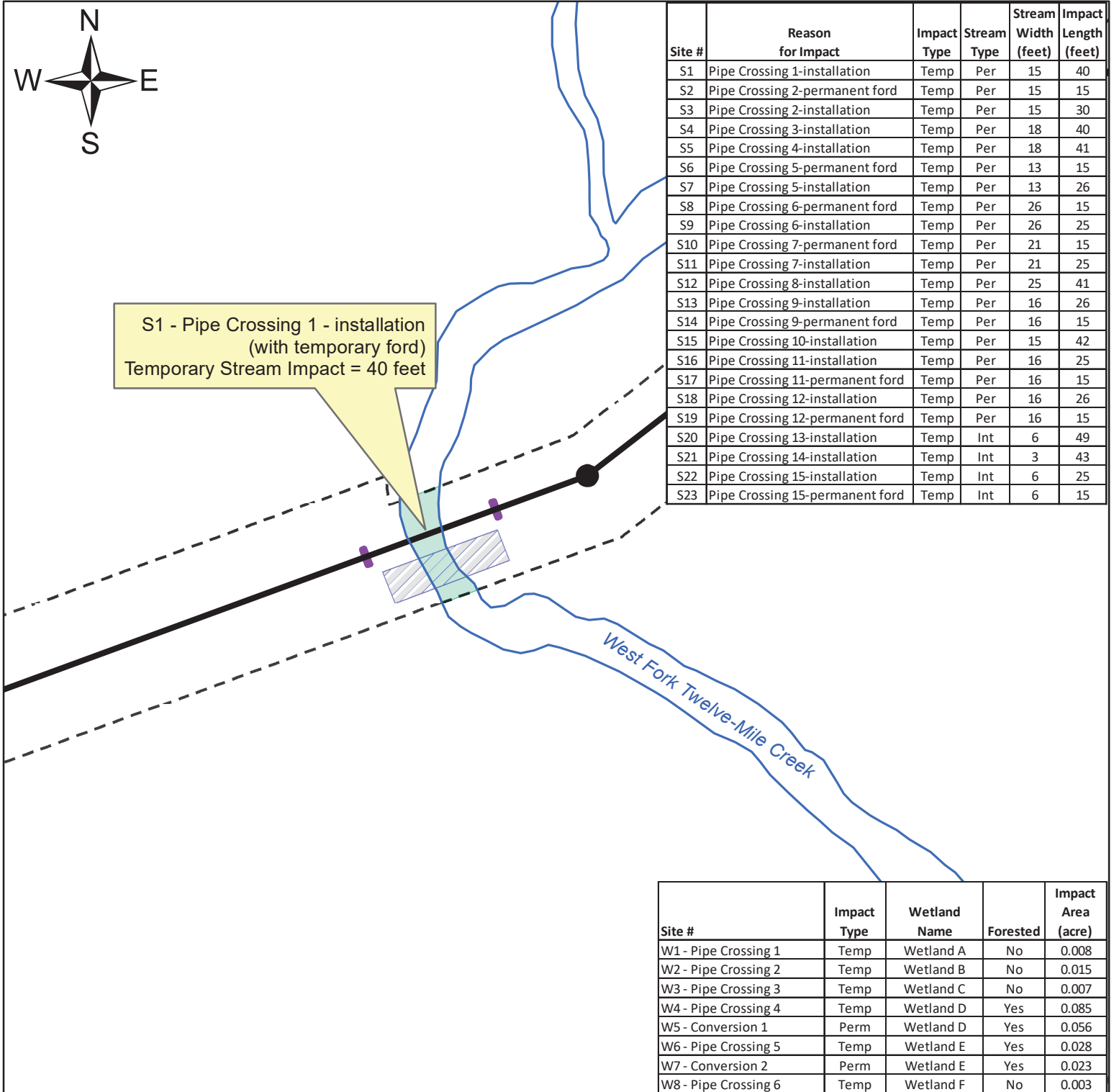
Hazen

IMPACT MAP INDEX

West Fork
Twelve-Mile Creek Interceptor

Union County, North Carolina

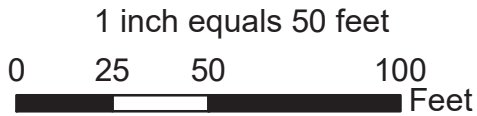
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Stream Impact
-  Anti-seep Collar
-  Temporary Construction Access Ford
-  Manhole












Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

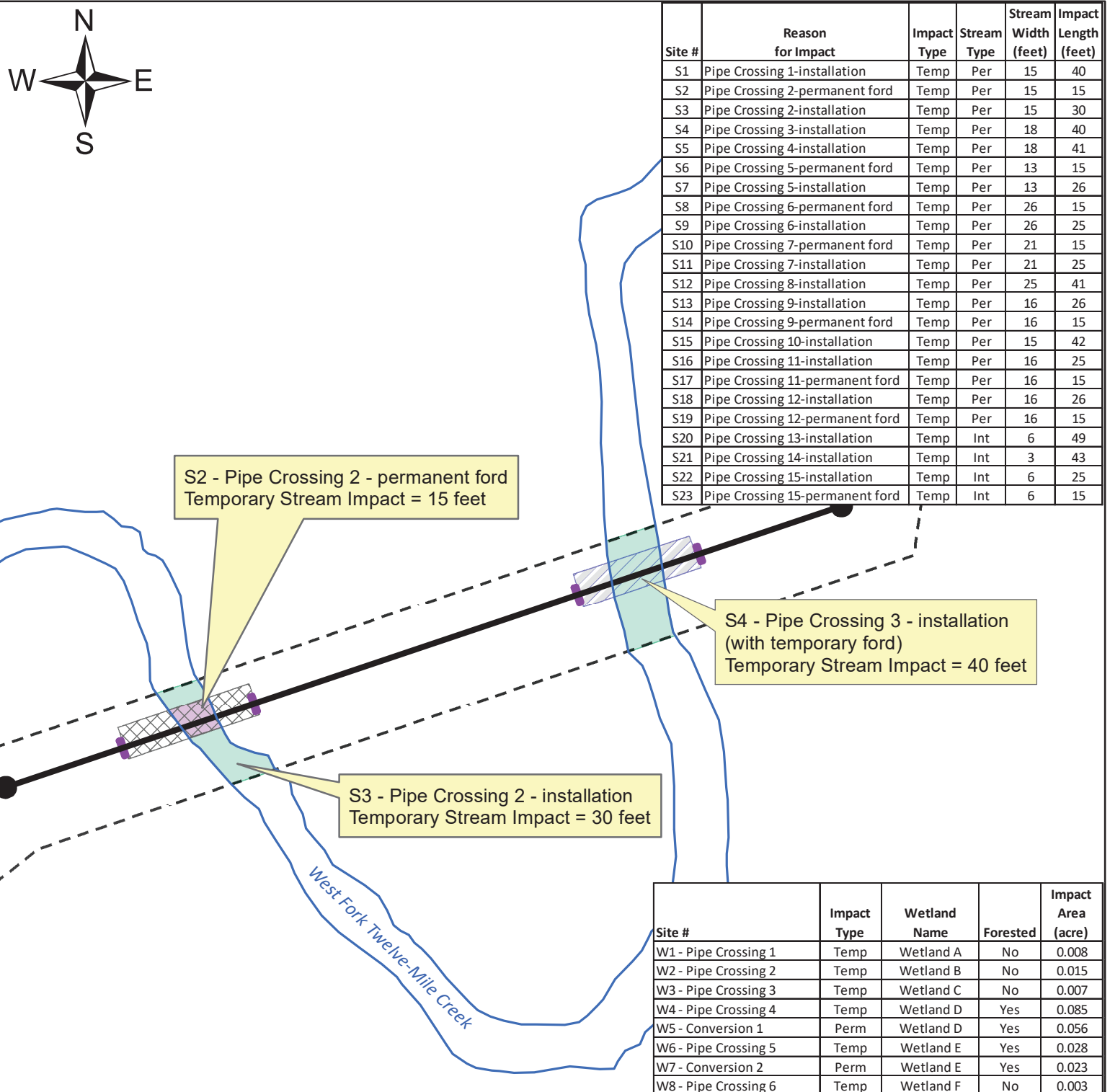
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 1
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Permanent Ford Area
-  Anti-seep Collar
-  Temporary Stream Impact
-  Manhole
-  Permanent Access and Ford
-  Temporary Construction Access Ford



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

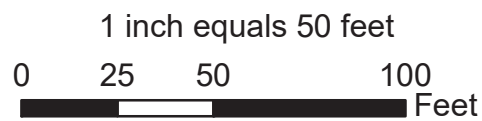
S2 - Pipe Crossing 2 - permanent ford
Temporary Stream Impact = 15 feet

S4 - Pipe Crossing 3 - installation
(with temporary ford)
Temporary Stream Impact = 40 feet










S3 - Pipe Crossing 2 - installation
Temporary Stream Impact = 30 feet

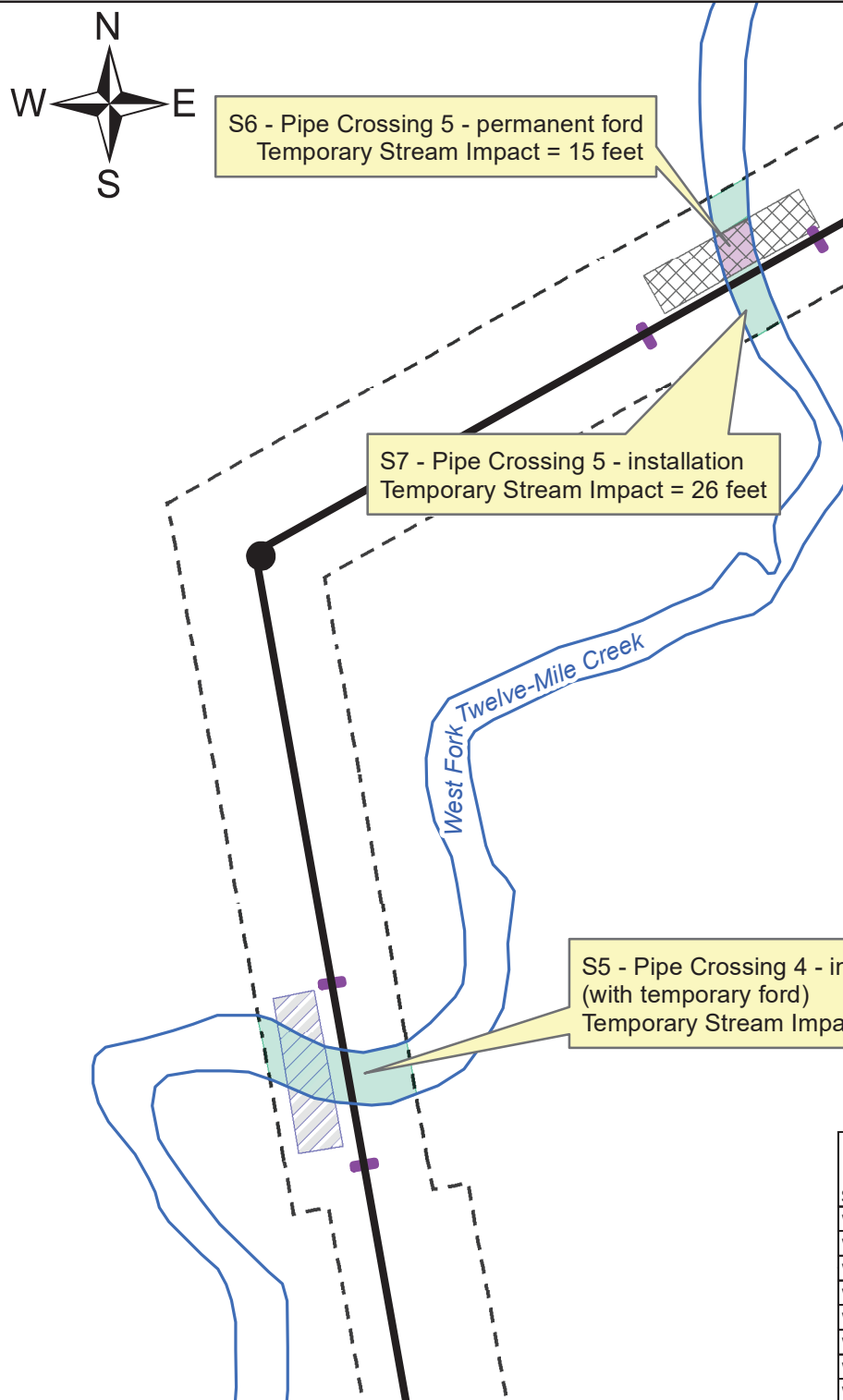
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 2
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

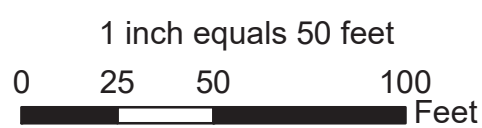
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Permanent Ford Area
-  Anti-seep Collar
-  Temporary Stream Impact
-  Manhole
-  Permanent Access and Ford
-  Temporary Construction Access Ford



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

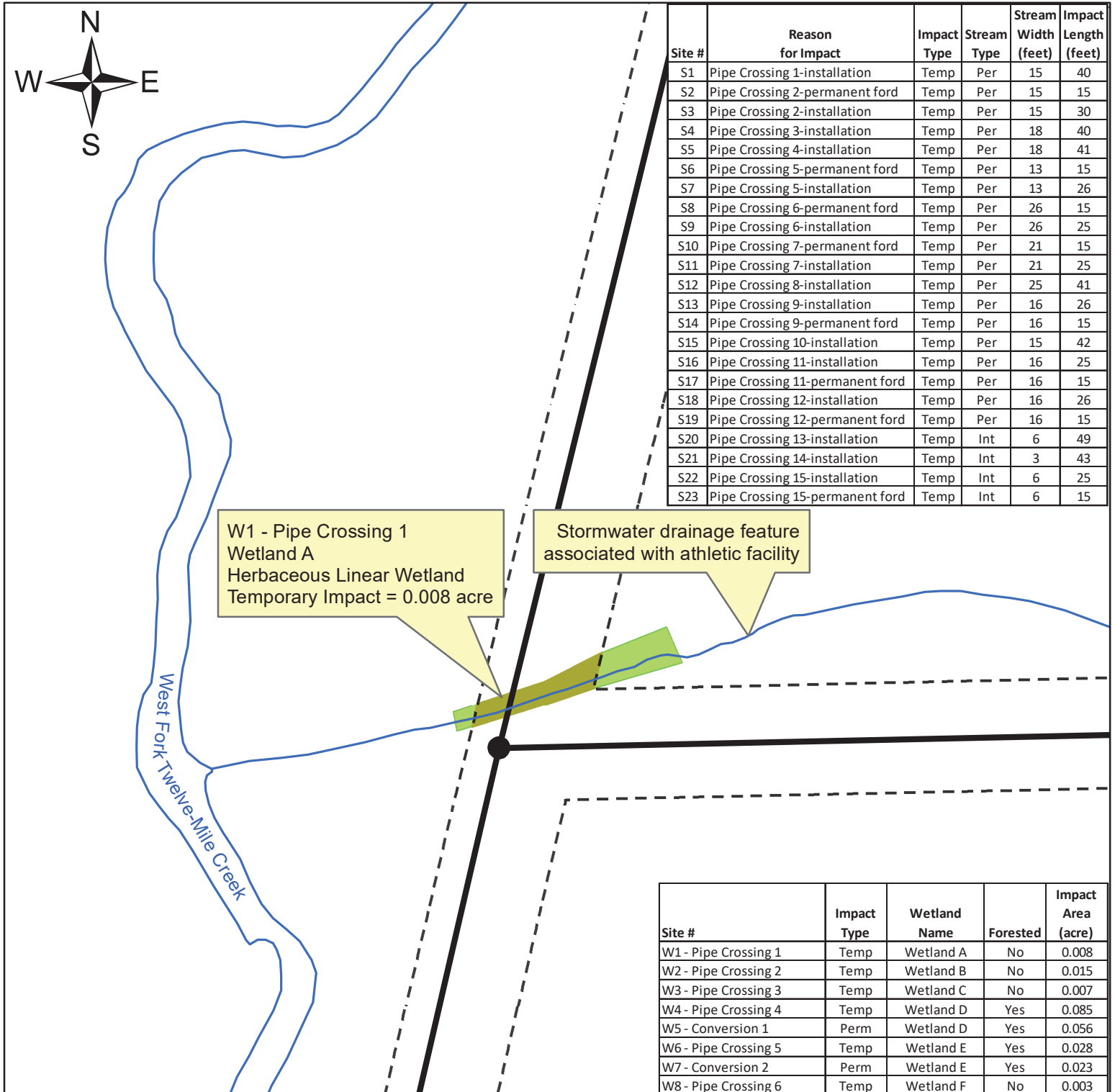
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 3
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

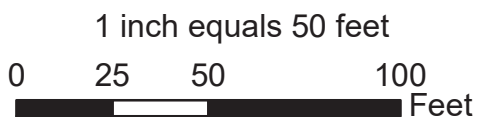
-  Limits of Disturbance
-  Jurisdictional Wetland
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Wetland Impact
-  Anti-seep Collar
-  Manhole



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

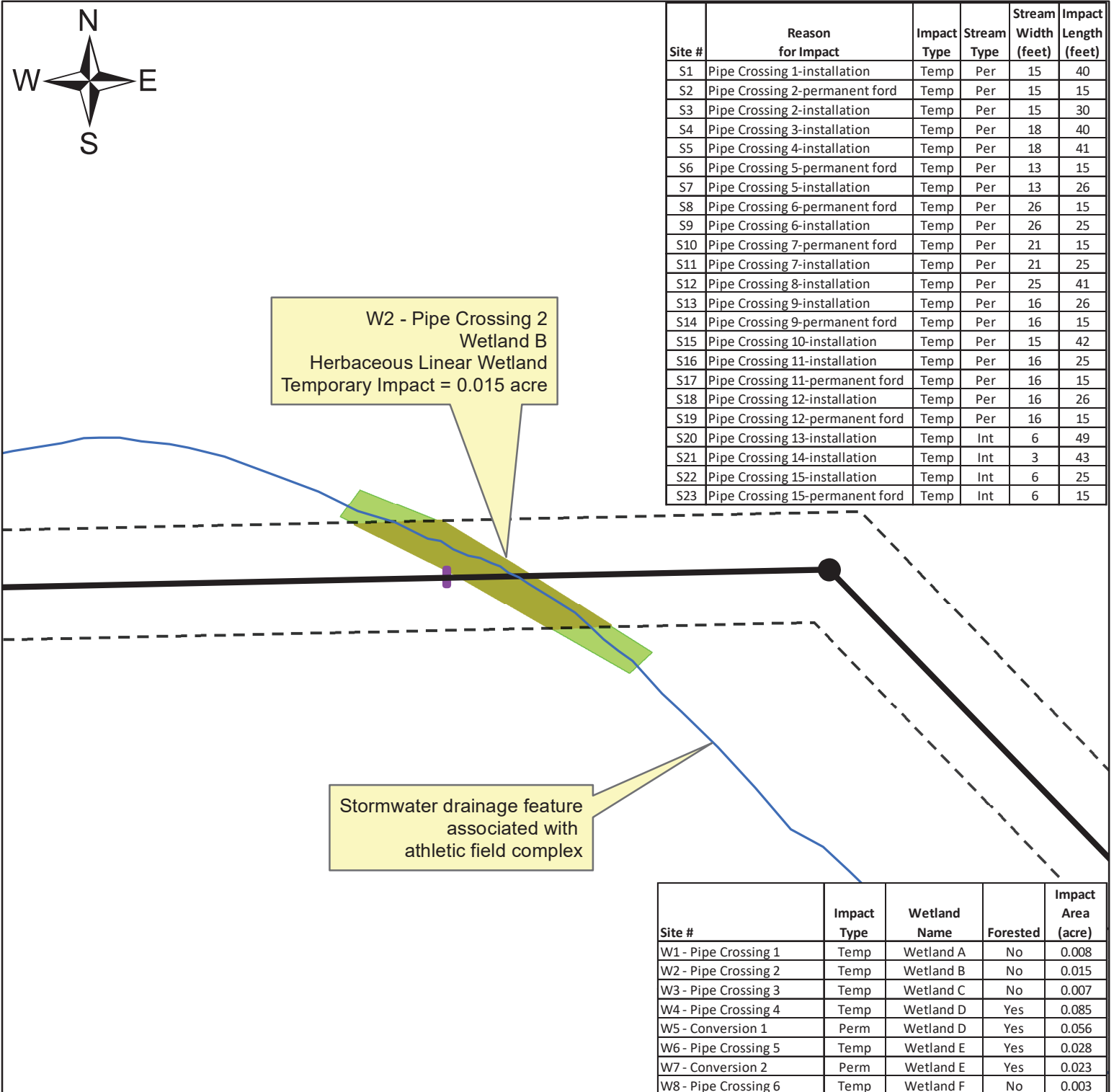
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 4
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

-  Limits of Disturbance
-  Jurisdictional Wetland
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Wetland Impact
-  Anti-seep Collar
-  Manhole



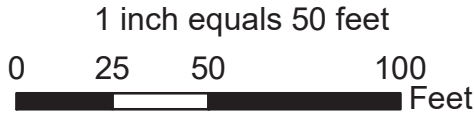
Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

W2 - Pipe Crossing 2
Wetland B
Herbaceous Linear Wetland
Temporary Impact = 0.015 acre

Stormwater drainage feature
associated with
athletic field complex

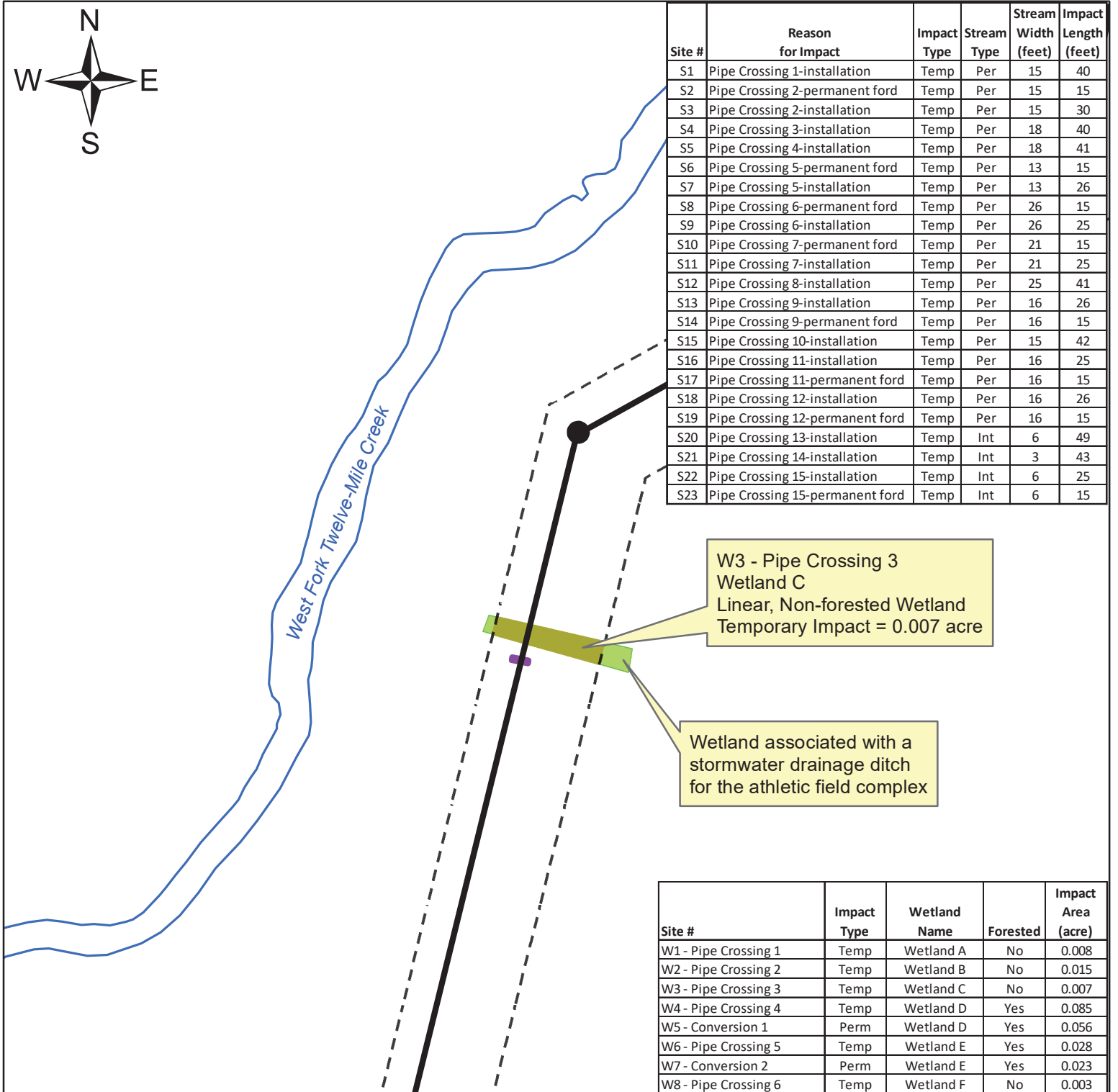
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021

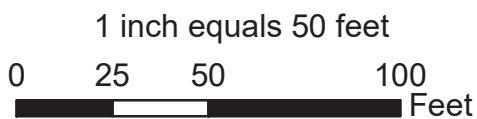


IMPACT MAP 5
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

- Limits of Disturbance
- Jurisdictional Wetland
- Stream
- Proposed Sanitary Sewer Line
- Temporary Wetland Impact
- Anti-seep Collar
- Manhole











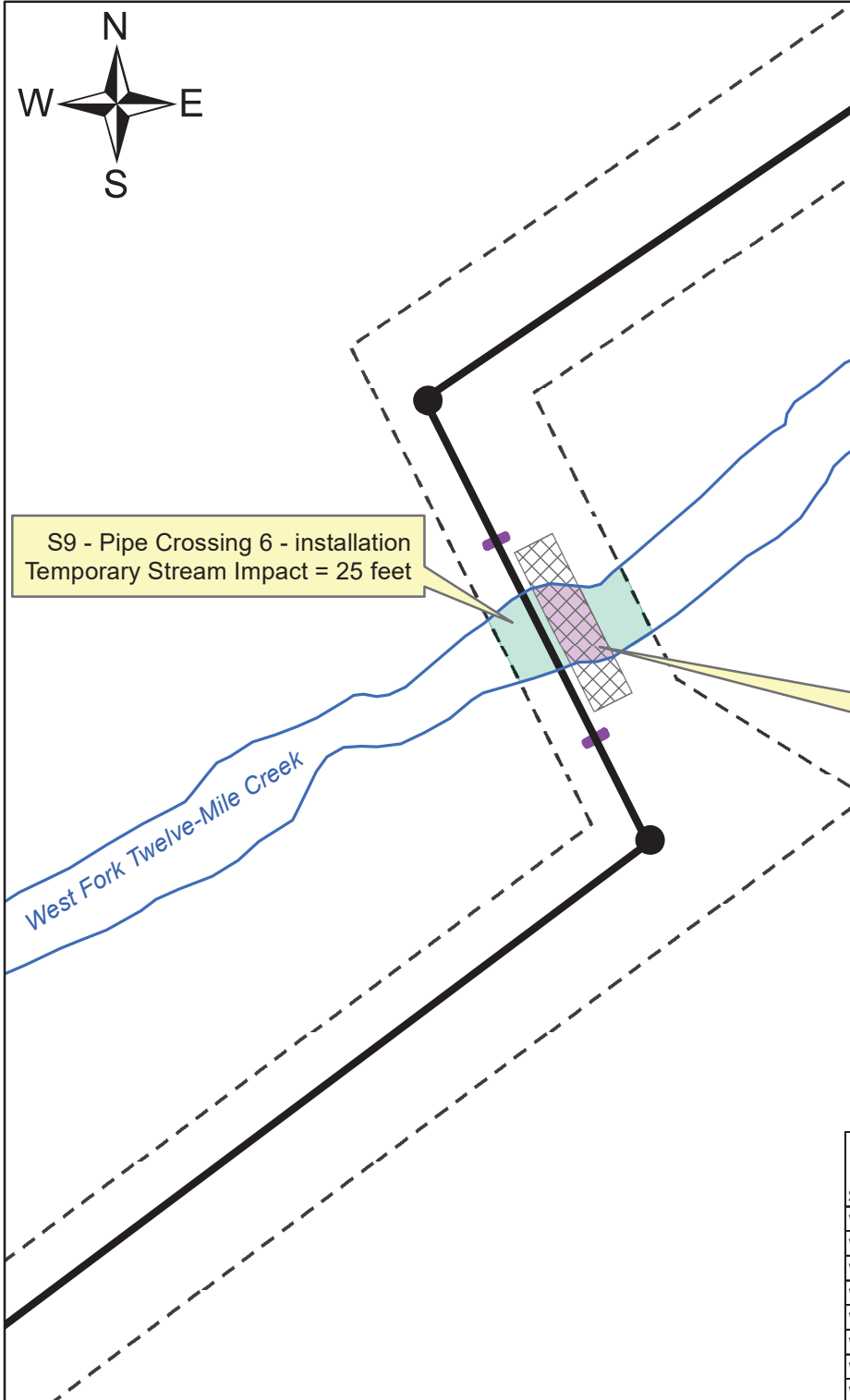
Date: 2/16/2021



Hazen

IMPACT MAP 6
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

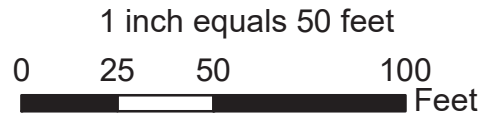
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Permanent Ford Area
-  Anti-seep Collar
-  Temporary Stream Impact
-  Manhole
-  Permanent Access and Ford



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 7
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

--- Limits of Disturbance

Jurisdictional Wetland Stream

— Proposed Sanitary Sewer Line

Permanent Ford Area

Temporary Stream Impact

Permanent Access and Ford

Anti-seep Collar

Manhole



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

S10 - Pipe Crossing 7 - permanent ford
Temporary Stream Impact = 15 feet

S11 - Pipe Crossing 7 - installation
Temporary Stream Impact = 25 feet

Wetland - No impact
Project limits moved to avoid impacts

Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021

1 inch equals 50 feet










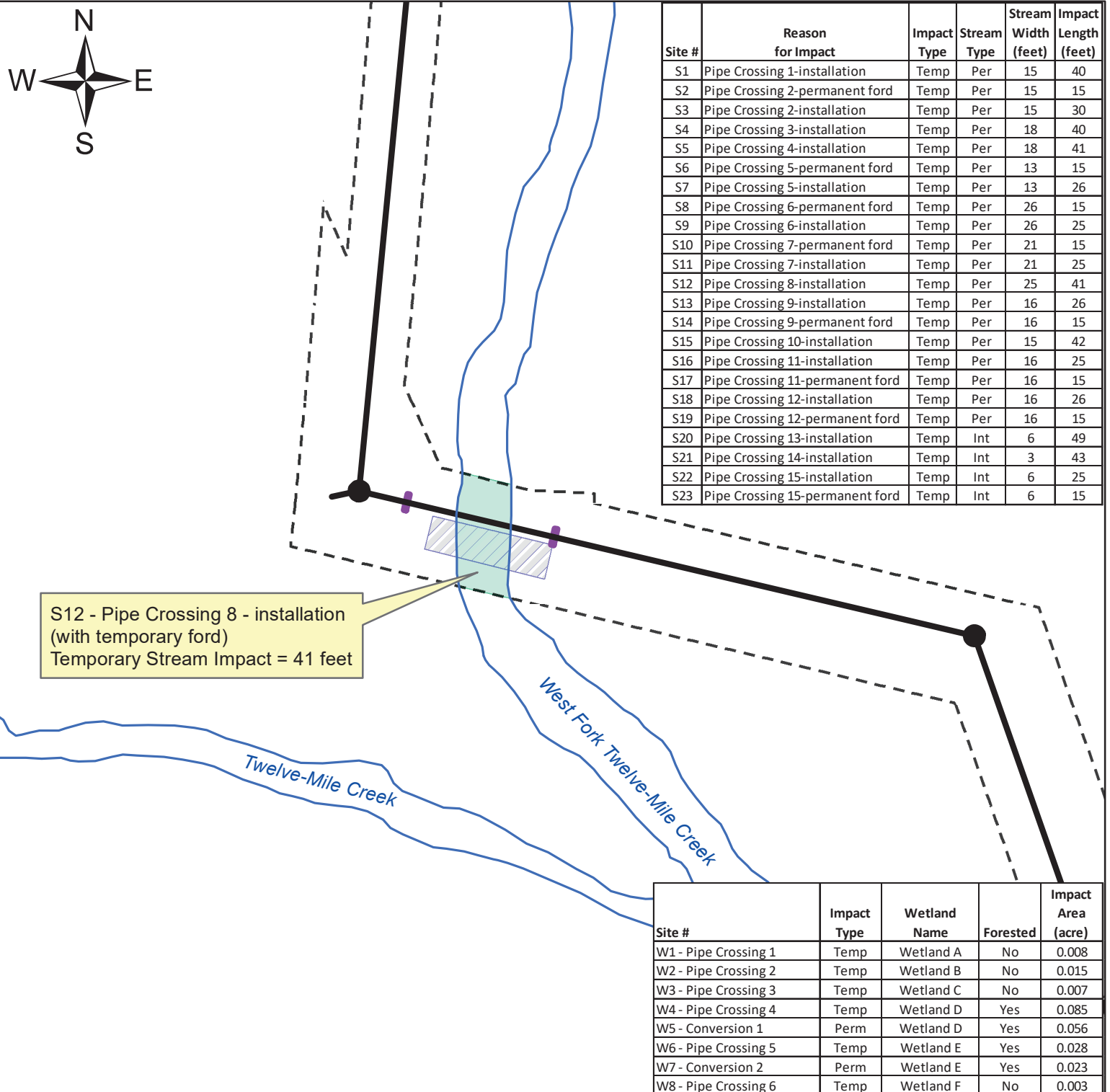
Hazen

IMPACT MAP 8

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

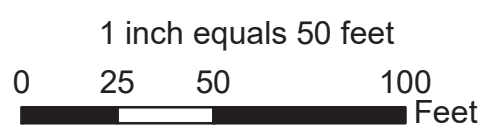
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Stream Impact
-  Anti-seep Collar
-  Temporary Construction Access Ford
-  Manhole



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

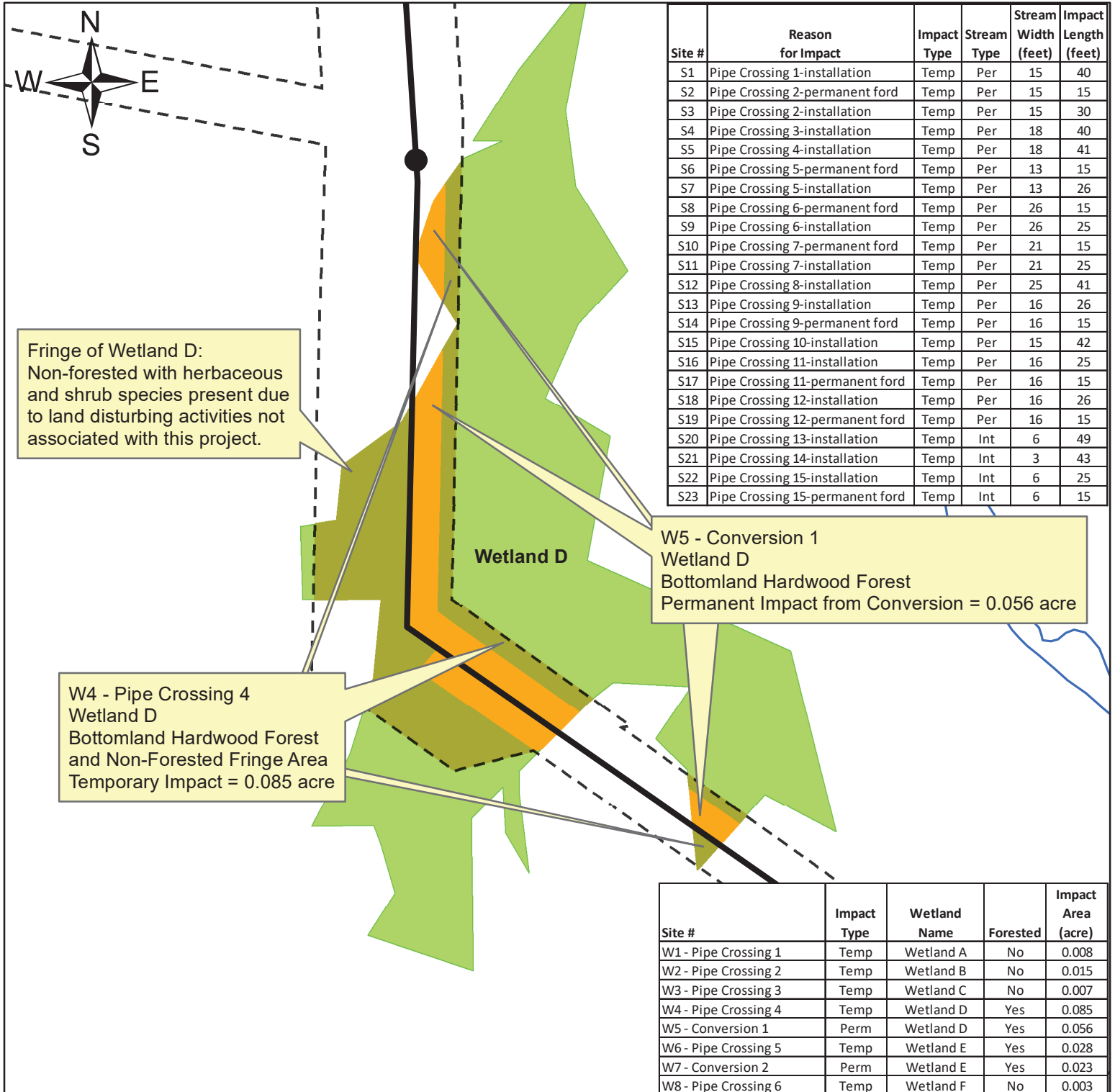
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021

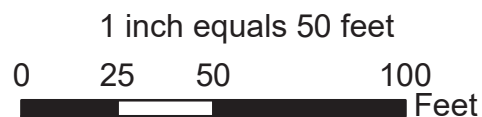


IMPACT MAP 9
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

-  Limits of Disturbance
-  Jurisdictional Wetland
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Wetland Impact
-  Anti-seep Collar
-  Permanent Wetland Impact from Conversion
-  Manhole



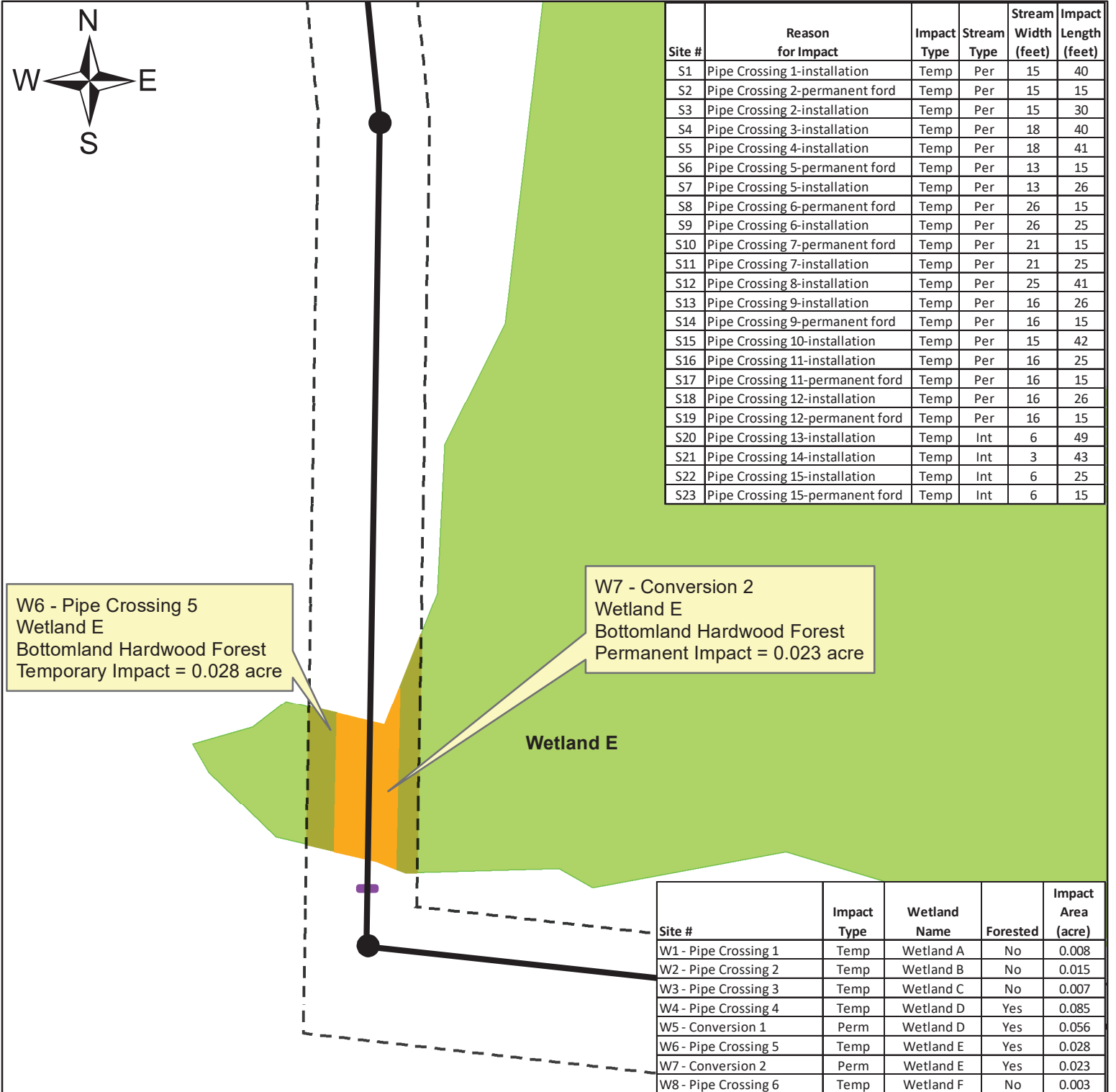
Date: 2/16/2021



Hazen

IMPACT MAP 10
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

- Limits of Disturbance
- Jurisdictional Wetland
- Proposed Sanitary Sewer Line
- Temporary Wetland Impact
- Anti-seep Collar
- Permanent Wetland Impact from Conversion
- Manhole



Date: 2/16/2021

1 inch equals 50 feet












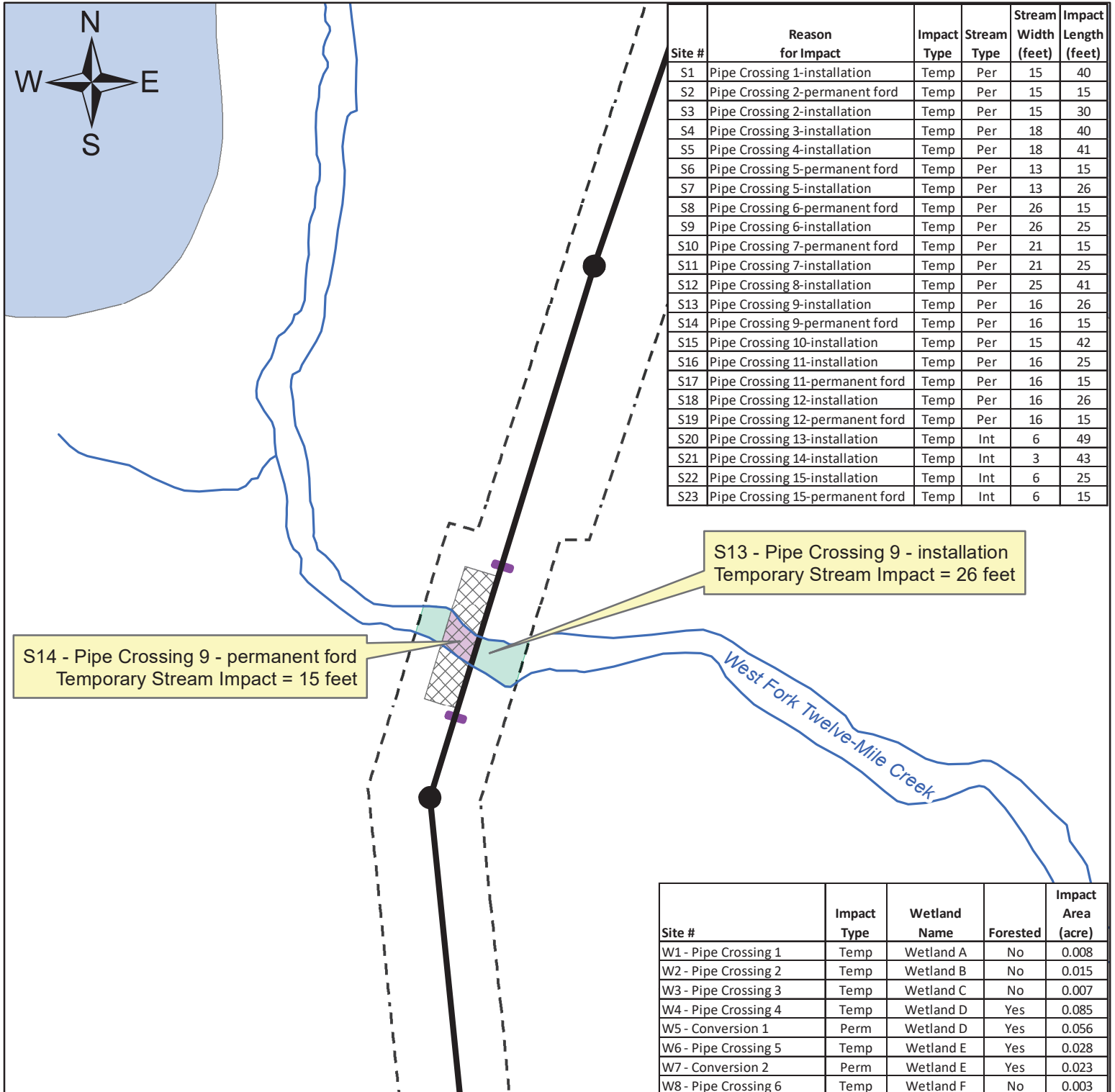
Hazen

IMPACT MAP 11

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Proposed Sanitary Sewer Line
-  Anti-seep Collar
-  Manhole
-  Pond
-  Stream
-  Permanent Ford Area
-  Temporary Stream Impact
-  Permanent Access and Ford



Date: 2/16/2021

1 inch equals 50 feet










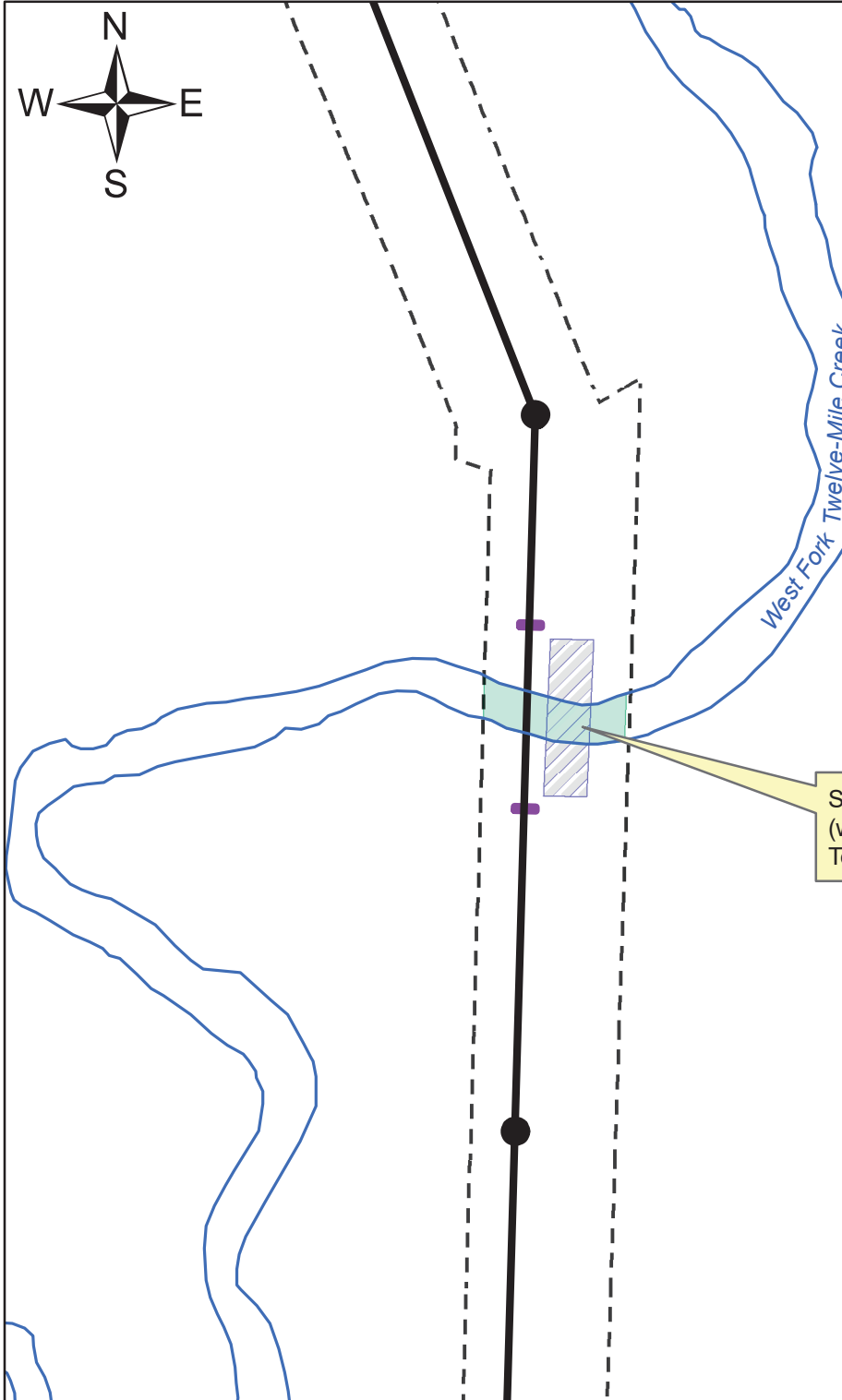
Hazen

IMPACT MAP 12

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Stream Impact
-  Anti-seep Collar
-  Temporary Construction Access Ford
-  Manhole



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

S15 - Pipe Crossing 10 - installation (with temporary ford)
Temporary Stream Impact = 42 feet

Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021

1 inch equals 50 feet











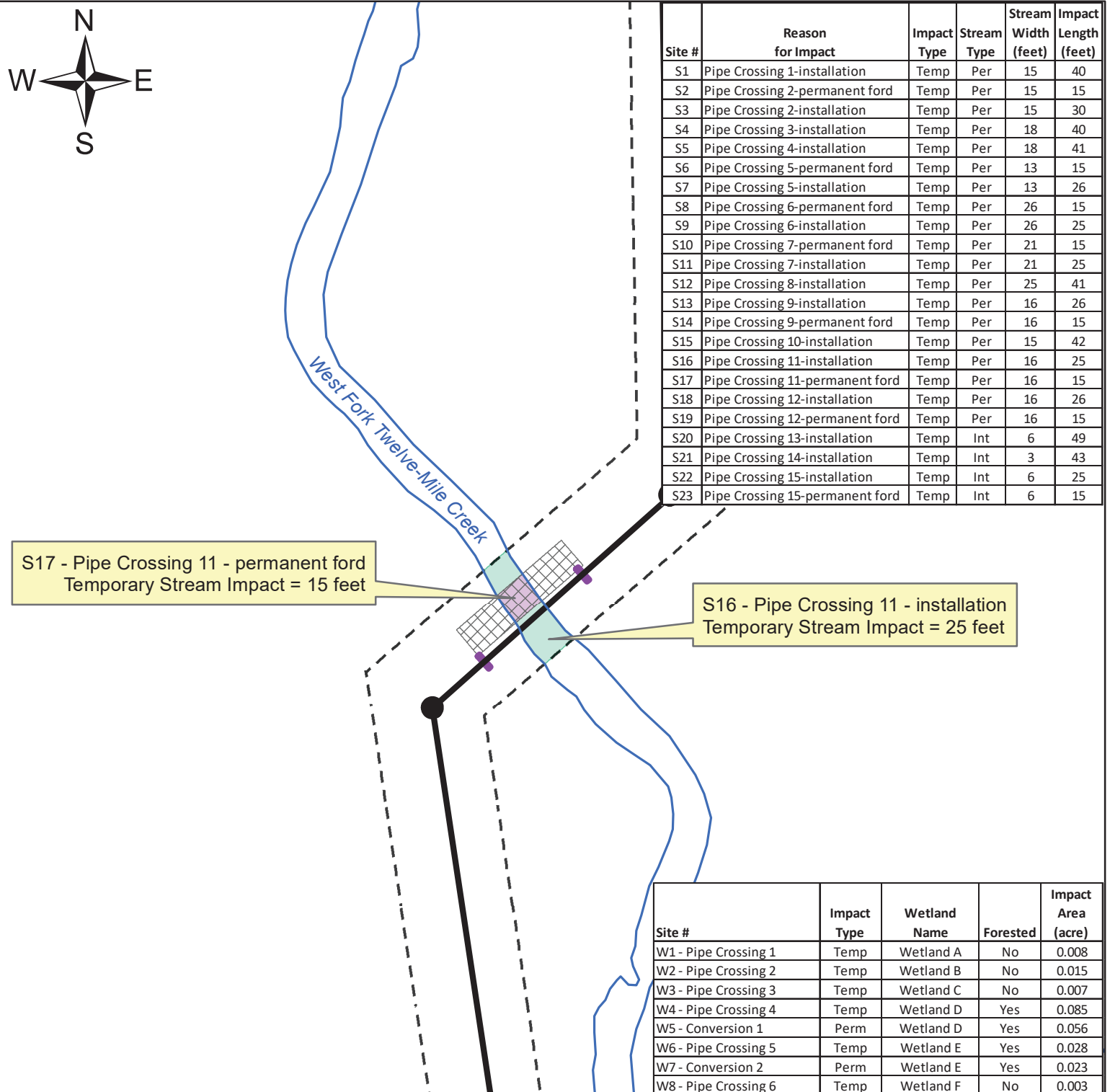
Hazen

IMPACT MAP 13

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

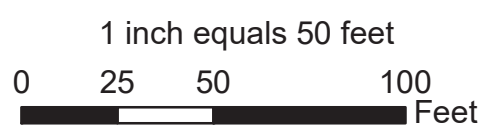
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Permanent Ford Area
-  Anti-seep Collar
-  Temporary Stream Impact
-  Manhole
-  Permanent Access and Ford












Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

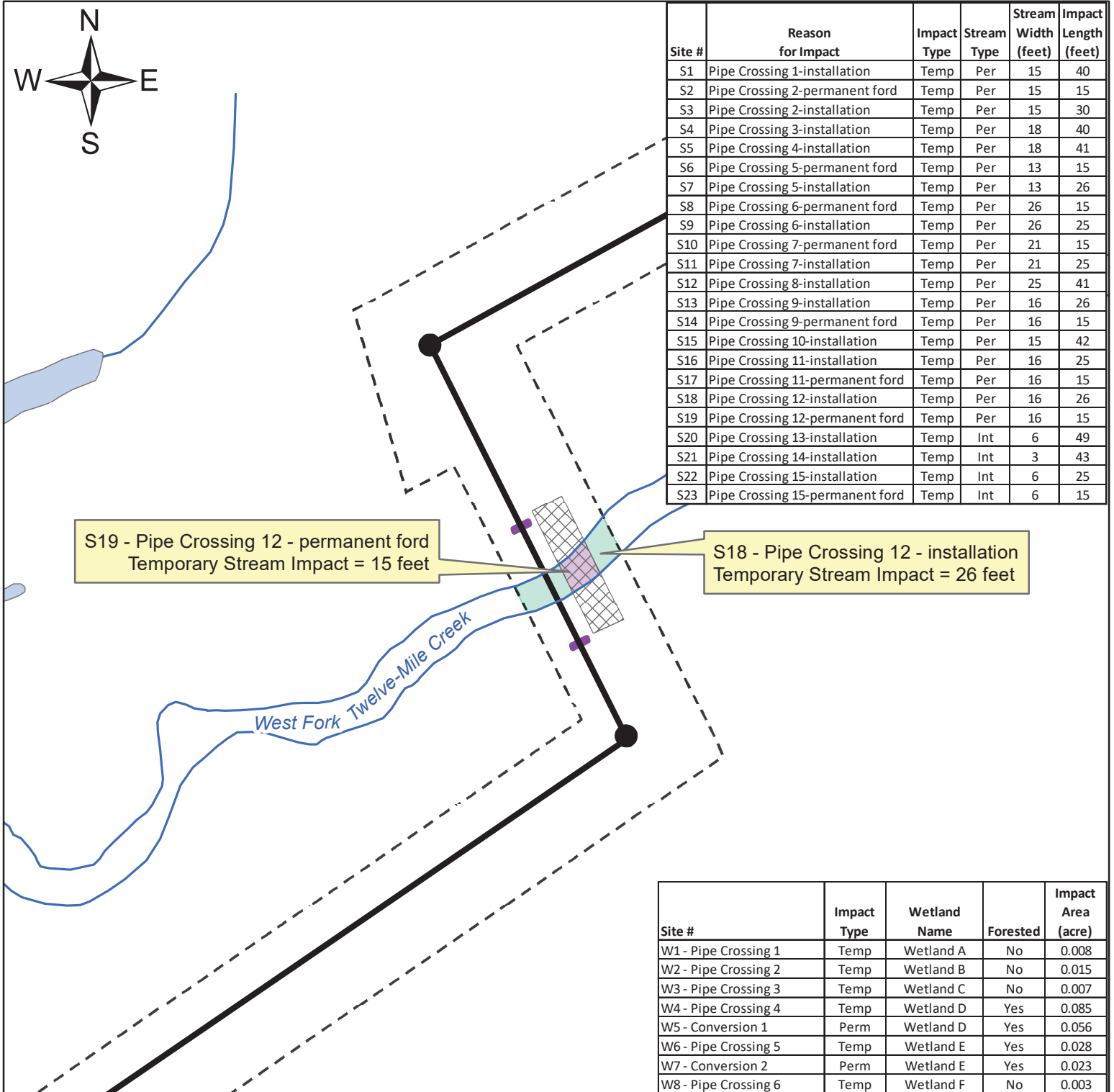
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 14
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

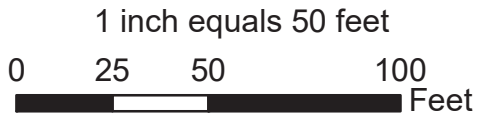
-  Limits of Disturbance
-  Proposed Sanitary Sewer Line
-  Anti-seep Collar
-  Manhole
-  Pond
-  Stream
-  Permanent Ford Area
-  Temporary Stream Impact
-  Permanent Access and Ford



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15








Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

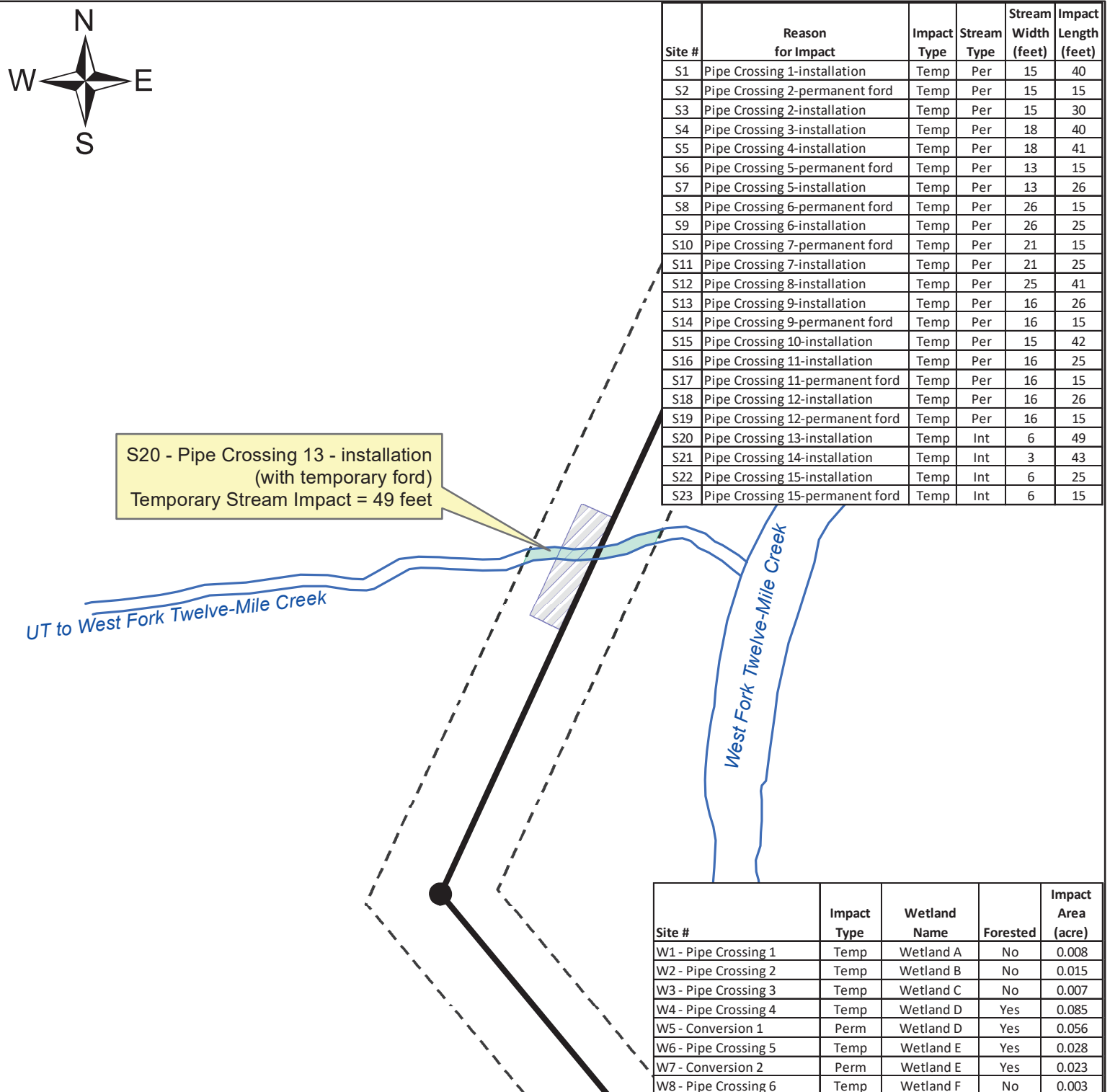
Date: 2/16/2021



Hazen

IMPACT MAP 15
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

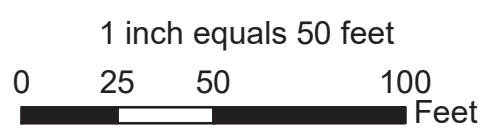
-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Temporary Stream Impact
-  Anti-seep Collar
-  Temporary Construction Access Ford
-  Manhole



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

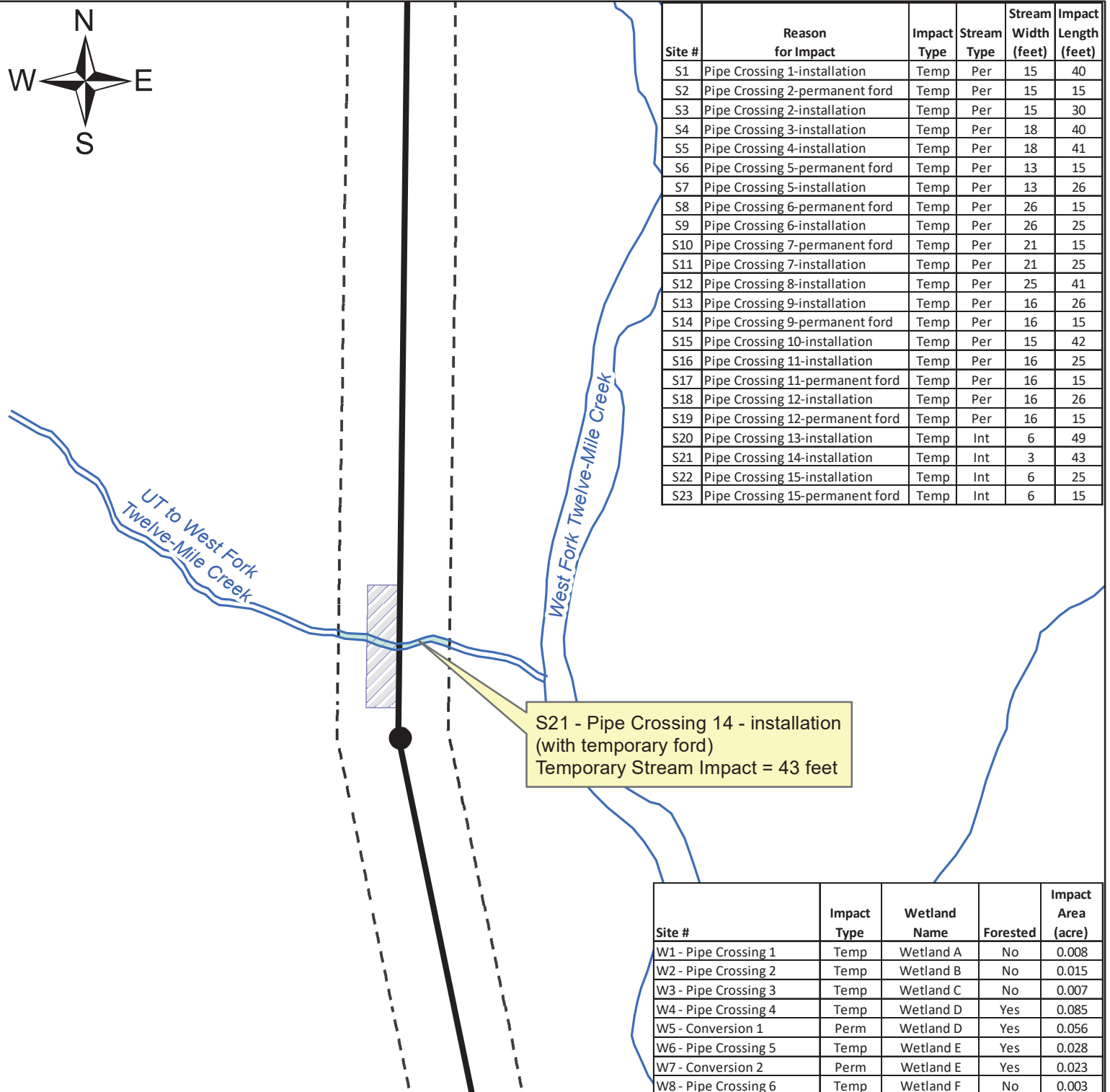
Date: 2/16/2021



Hazen

IMPACT MAP 16
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

- Limits of Disturbance
- Stream
- Proposed Sanitary Sewer Line
- Temporary Stream Impact
- Anti-seep Collar
- Temporary Construction Access Ford
- Manhole

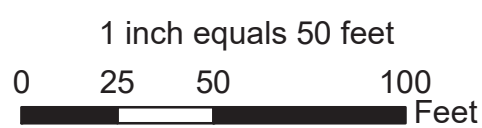


Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

S21 - Pipe Crossing 14 - installation
(with temporary ford)
Temporary Stream Impact = 43 feet

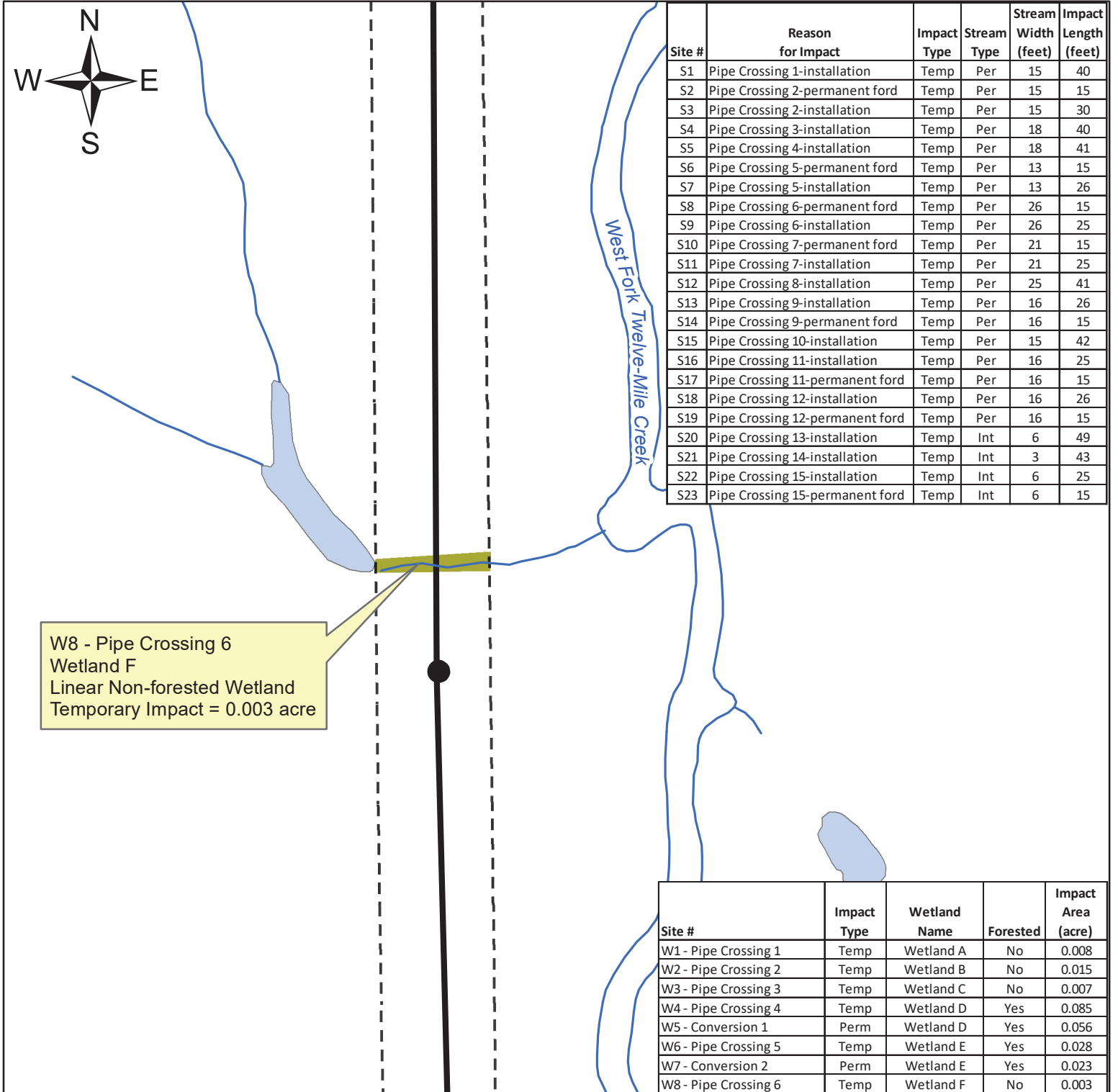
Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021



IMPACT MAP 17
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

- Limits of Disturbance
- Pond
- Stream
- Proposed Sanitary Sewer Line
- Jurisdictional Wetland
- Anti-seep Collar
- Temporary Wetland Impact
- Manhole



Date: 2/16/2021

1 inch equals 50 feet











Hazen

IMPACT MAP 18

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Proposed Sanitary Sewer Line
-  Permanent Ford Area
-  Anti-seep Collar
-  Temporary Stream Impact
-  Manhole
-  Permanent Access and Ford



Site #	Reason for Impact	Impact Type	Stream Type	Stream Width (feet)	Impact Length (feet)
S1	Pipe Crossing 1-installation	Temp	Per	15	40
S2	Pipe Crossing 2-permanent ford	Temp	Per	15	15
S3	Pipe Crossing 2-installation	Temp	Per	15	30
S4	Pipe Crossing 3-installation	Temp	Per	18	40
S5	Pipe Crossing 4-installation	Temp	Per	18	41
S6	Pipe Crossing 5-permanent ford	Temp	Per	13	15
S7	Pipe Crossing 5-installation	Temp	Per	13	26
S8	Pipe Crossing 6-permanent ford	Temp	Per	26	15
S9	Pipe Crossing 6-installation	Temp	Per	26	25
S10	Pipe Crossing 7-permanent ford	Temp	Per	21	15
S11	Pipe Crossing 7-installation	Temp	Per	21	25
S12	Pipe Crossing 8-installation	Temp	Per	25	41
S13	Pipe Crossing 9-installation	Temp	Per	16	26
S14	Pipe Crossing 9-permanent ford	Temp	Per	16	15
S15	Pipe Crossing 10-installation	Temp	Per	15	42
S16	Pipe Crossing 11-installation	Temp	Per	16	25
S17	Pipe Crossing 11-permanent ford	Temp	Per	16	15
S18	Pipe Crossing 12-installation	Temp	Per	16	26
S19	Pipe Crossing 12-permanent ford	Temp	Per	16	15
S20	Pipe Crossing 13-installation	Temp	Int	6	49
S21	Pipe Crossing 14-installation	Temp	Int	3	43
S22	Pipe Crossing 15-installation	Temp	Int	6	25
S23	Pipe Crossing 15-permanent ford	Temp	Int	6	15

S22 - Pipe Crossing 15 - installation
Temporary Stream Impact = 25 feet

S23 - Pipe Crossing 15 - permanent ford
Temporary Stream Impact = 15 feet

Site #	Impact Type	Wetland Name	Forested	Impact Area (acre)
W1 - Pipe Crossing 1	Temp	Wetland A	No	0.008
W2 - Pipe Crossing 2	Temp	Wetland B	No	0.015
W3 - Pipe Crossing 3	Temp	Wetland C	No	0.007
W4 - Pipe Crossing 4	Temp	Wetland D	Yes	0.085
W5 - Conversion 1	Perm	Wetland D	Yes	0.056
W6 - Pipe Crossing 5	Temp	Wetland E	Yes	0.028
W7 - Conversion 2	Perm	Wetland E	Yes	0.023
W8 - Pipe Crossing 6	Temp	Wetland F	No	0.003

Date: 2/16/2021

1 inch equals 50 feet



IMPACT MAP 19
West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina

A. Preliminary Determination

- There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated 2/15/2021. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters, including wetlands** have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters, including wetlands** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

- There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are **waters, including wetlands** on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- We recommend you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.
- The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated DATE. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.
- The **waters, including wetlands** have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on DATE. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Bryan Roden-Reynolds at 704-510-1440 or bryan.roden-reynolds@usace.army.mil**.

SAW-2018-01351

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 03/16/2021.

D. Remarks: None.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Phillip Shannin, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by DATE.

****It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.****

Corps Regulatory Official: _____  _____ Bryan Roden-Reynolds
2021.03.26 13:43:29 -04'00'

Date of JD: 03/16/2021 Expiration Date of JD: not applicable

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

**NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND
REQUEST FOR APPEAL**

Applicant: **Union County Public Works Department,
John Shutak**

File Number: **SAW-2018-01351**

Date: **03/16/2021**

Attached is:

See Section below

<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at or <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx> or the Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:
District Engineer, Wilmington Regulatory Division
Attn: Bryan Roden-Reynolds
Charlotte Regulatory Office
U.S Army Corps of Engineers
8430 University Executive Park Drive, Suite 615
Charlotte, North Carolina 28262

If you only have questions regarding the appeal process you may also contact:
 Mr. Phillip Shannin, Administrative Appeal Review Officer
 CESAD-PDO
 U.S. Army Corps of Engineers, South Atlantic Division
 60 Forsyth Street, Room 10M15
 Atlanta, Georgia 30303-8801
 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:
---	-------	-------------------

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Bryan Roden-Reynolds, 69 Darlington Avenue, Wilmington, North Carolina 28403

For Permit denials, Proffered Permits and Approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Phillip Shannin, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

- A. REPORT COMPLETION DATE FOR PJD:** 3/26/2021
- B. NAME AND ADDRESS OF PERSON REQUESTING PJD:** Union County Public Works Department, John Shutak, 500 North Main Street, Monroe, NC 28112
- C. DISTRICT OFFICE, FILE NAME, AND NUMBER:** Wilmington District, West Fork Twelve-Mile Creek Interceptor, SAW-2018-01351
- D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:** The review area consists of an approximately 4.8-mile long utility corridor which parallels West Fork Twelve Mile Creek south from east of the eastern terminus of Camrose Crossing to a point immediately north of Weddington Road.

(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: NC County: Union City: Matthews
 Center coordinates of site (lat/long in degree decimal format): Latitude: 35.027028 Longitude: -80.706443

Universal Transverse Mercator:

Name of nearest waterbody: West Fork Twelvemile Creek

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: **03/15/21**

Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION

Feature	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable)	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
WETLAND-A	35.00558200	-80.71310100	0.09 acres	Wetland	404
WETLAND-B	35.00558500	-80.71225900	0.016 acres	Wetland	404
WETLAND-C	35.00643400	-80.71293600	0.008 acres	Wetland	404
WETLAND-D	35.05178500	-80.71013900	0.144 acres	Wetland	404
WETLAND-E	35.02854800	-80.70926500	0.054 acres	Wetland	404
WETLAND-F	35.02854800	-80.70926500	0.004 acres	Wetland	404
West Fork Twelve-Mile Creek	35.00174700	-80.71646200	530 linear feet	Non-wetland	404
Tributary 1	35.04423900	-80.70872800	53 linear feet	Non-wetland	404
Tributary 2	35.04880800	-80.71003200	46 linear feet	Non-wetland	404
Tributary 3	35.05288800	-80.70999700	42 linear feet	Non-wetland	404

1. The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request

and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre- construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "*may be*" waters of the U.S. and/or that there "*may be*" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply) Checked items are included in the administrative record and are appropriately cited:

Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: _____

Data sheets prepared/submitted by or on behalf of the PJD requestor. Datasheets:

Office concurs with data sheets/delineation report.

Office does not concur with data sheets/delineation report. Rationale: _____

Data sheets prepared by the Corps: _____

Corps navigable waters' study:

U.S. Geological Survey Hydrologic Atlas:

USGS NHD data:

USGS 8 and 12 digit HUC maps:

U.S. Geological Survey map(s). Cite scale & quad name:

Natural Resources Conservation Service Soil Survey. Citation:

National wetlands inventory map(s). Cite name:

State/local wetland inventory map(s): _____

FEMA/FIRM maps:

100-year Floodplain Elevation is: _____ (National Geodetic Vertical Datum of 1929)


Photographs: Aerial (Name & Date):

or Other (Name & Date):

Previous determination(s). File no. and date of response letter: _____

Other information (please specify): **Delineation Index Map (Dated 02/15/21) and Delineation Map 1-19 (Dated 02/15/21)**

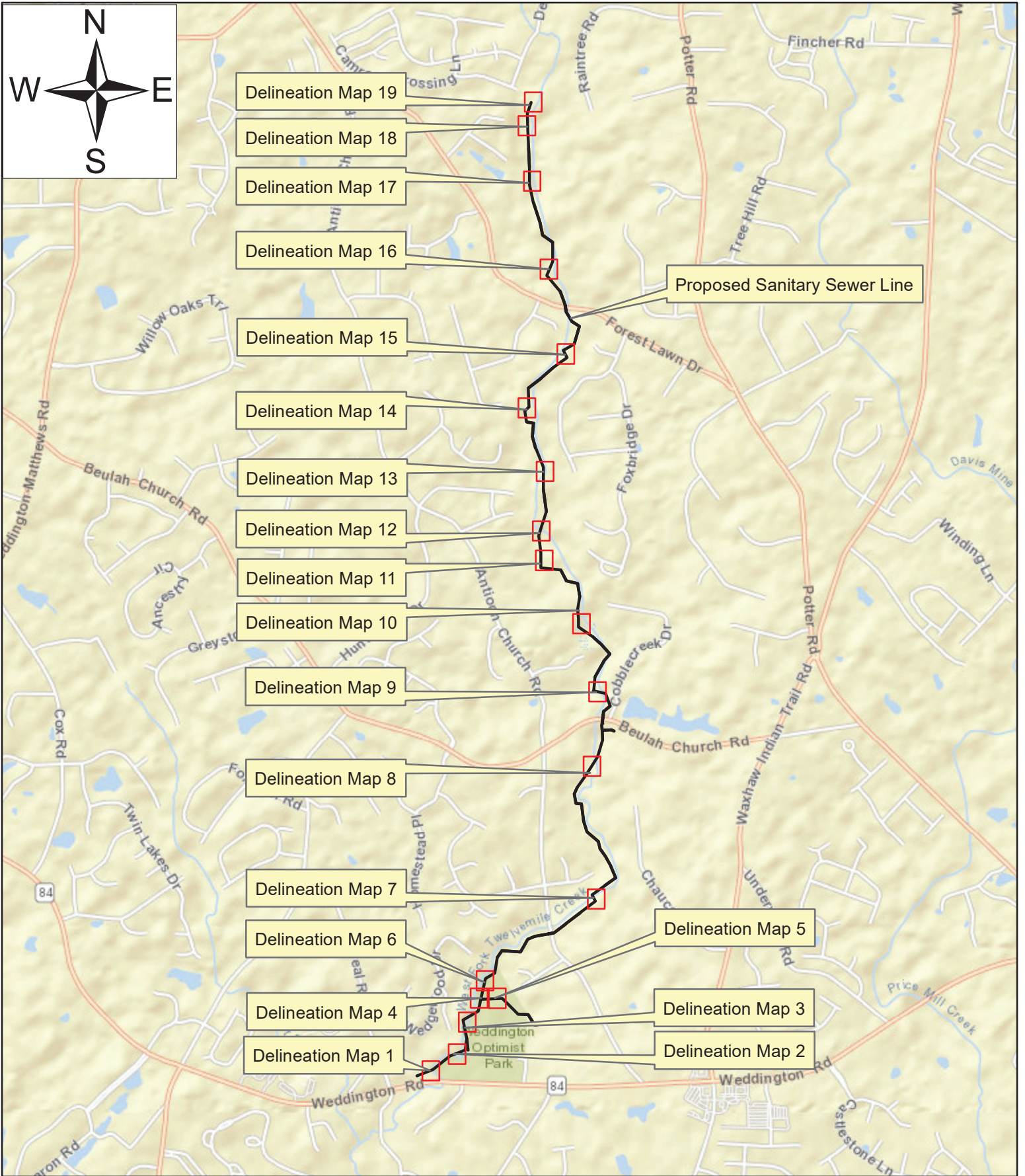
IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

 Bryan Roden-Reynolds
2021.03.26 13:42:59
-04'00'

Signature and date of Regulatory
staff member completing PJD
03/16/2021

Signature and date of person requesting PJD
(REQUIRED, unless obtaining the signature
is impracticable)¹

¹ Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.



Date: 2/15/2021

1 inch equals 3,000 feet

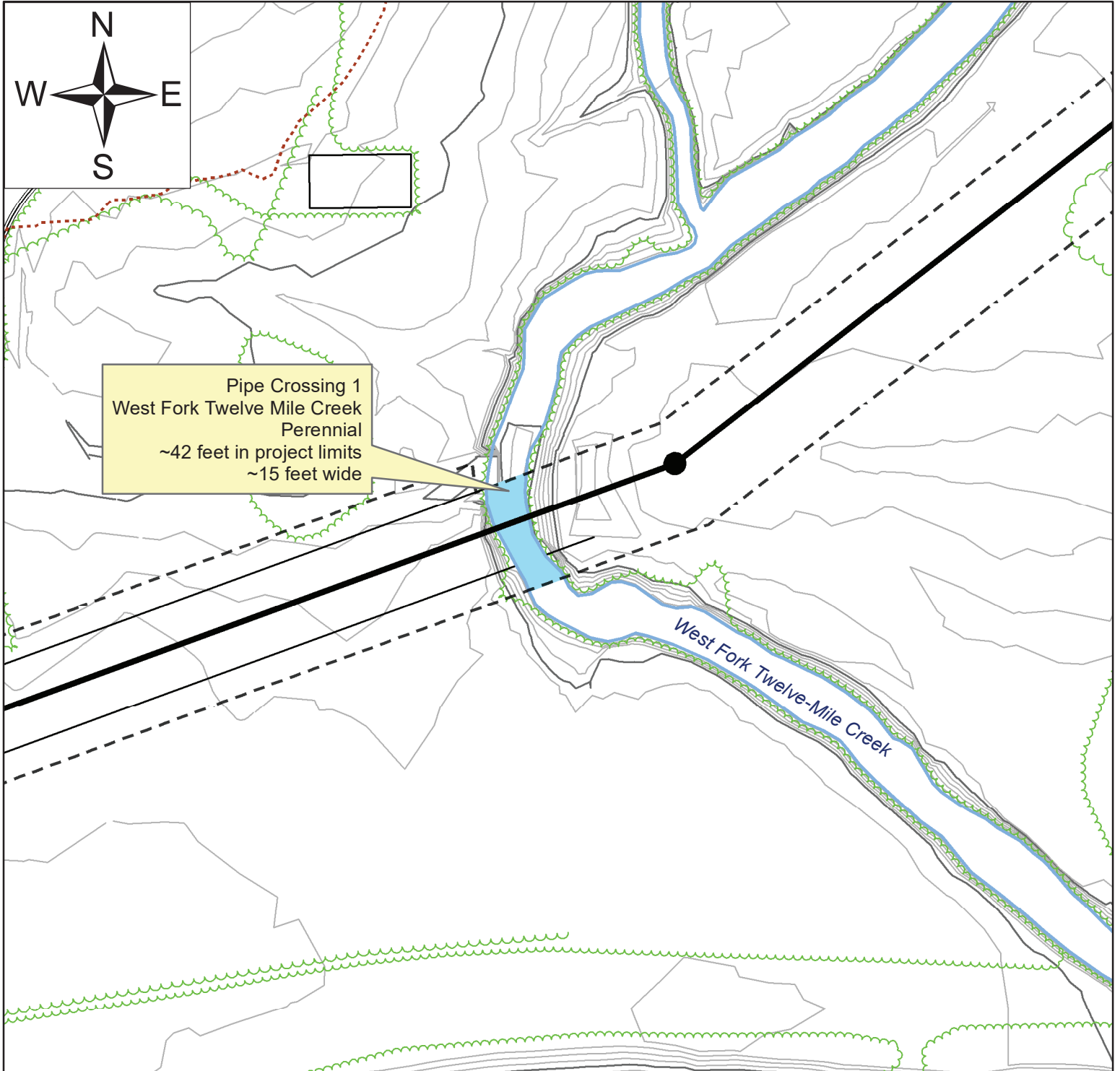


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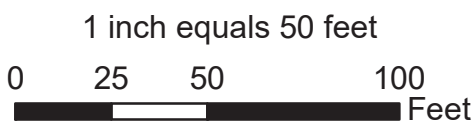
DELINEATION MAP INDEX

**West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina**

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



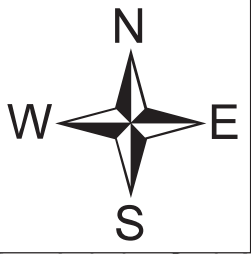
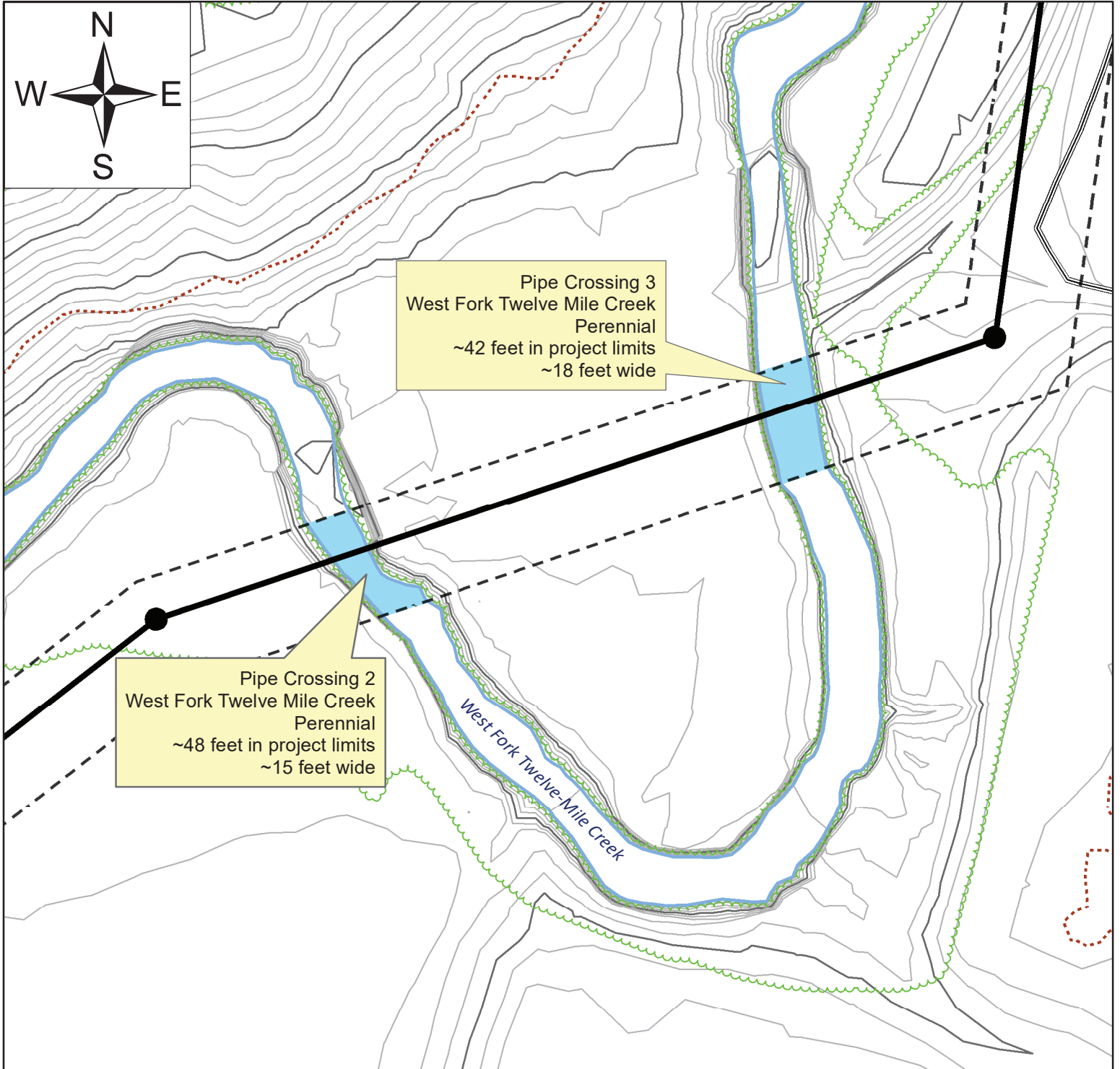
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DELINEATION MAP 1

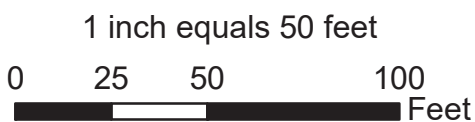
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
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-  100-year Flood Plain
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Date: 2/22/2021




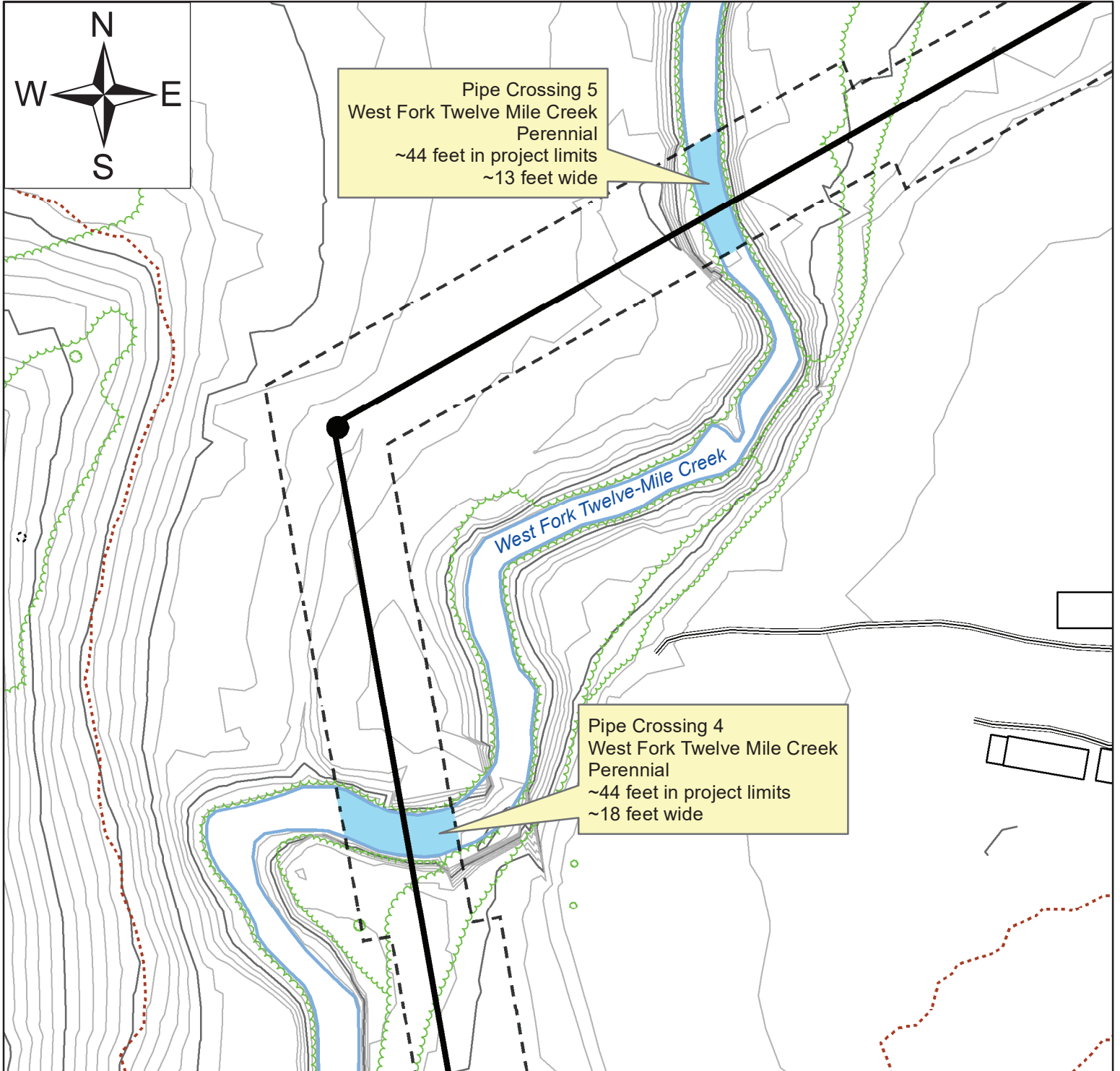
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DELINEATION MAP 2

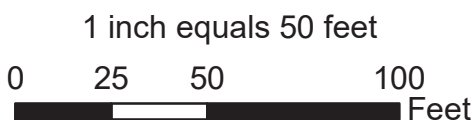
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
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Date: 2/22/2021





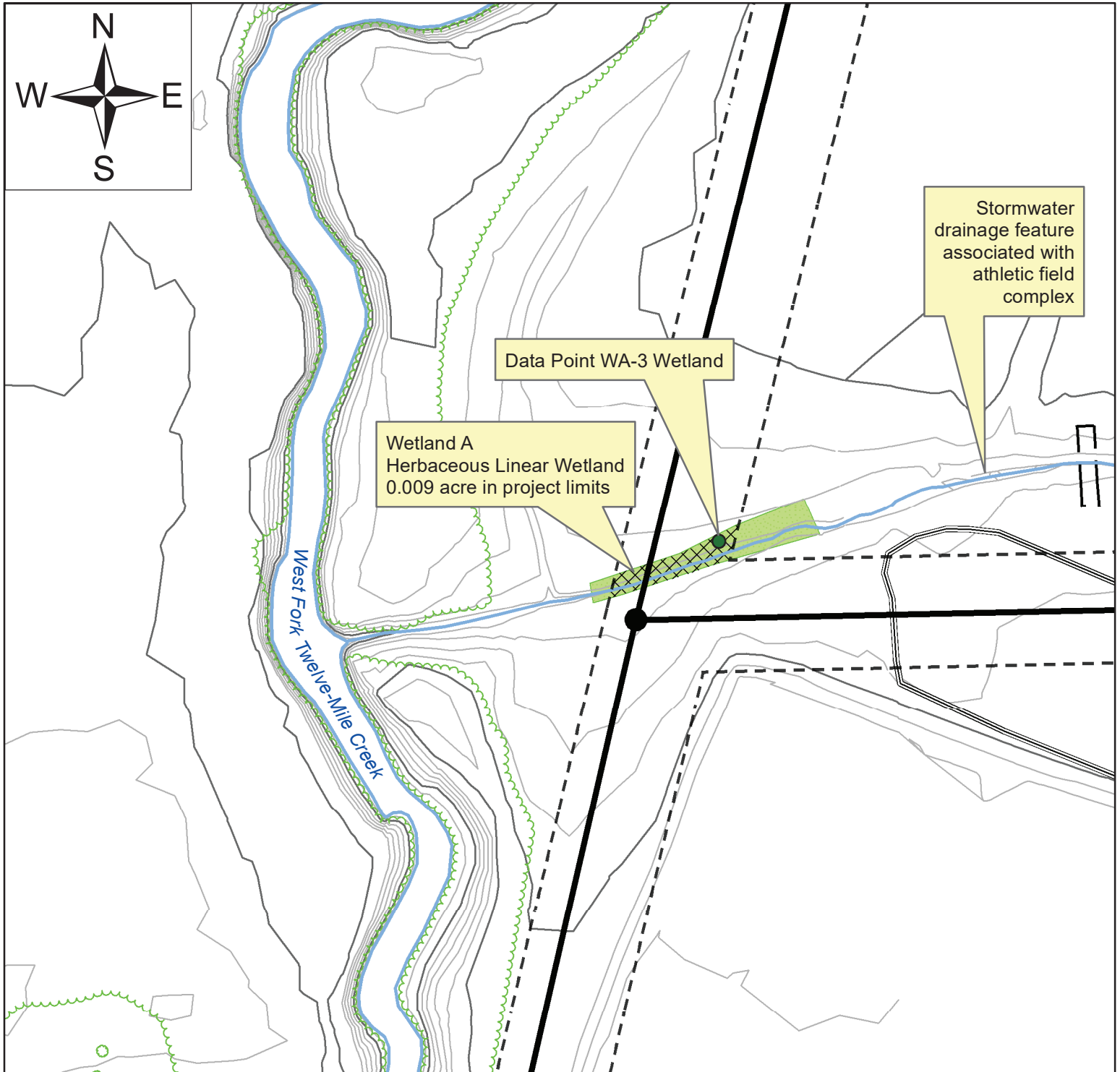
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DELINEATION MAP 3

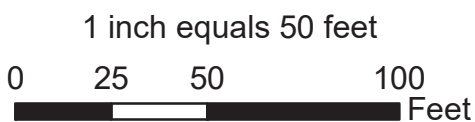
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
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-  Jurisdictional Wetland
-  Manhole
-  Jurisdictional Wetlands in Project Limits



Date: 2/22/2021










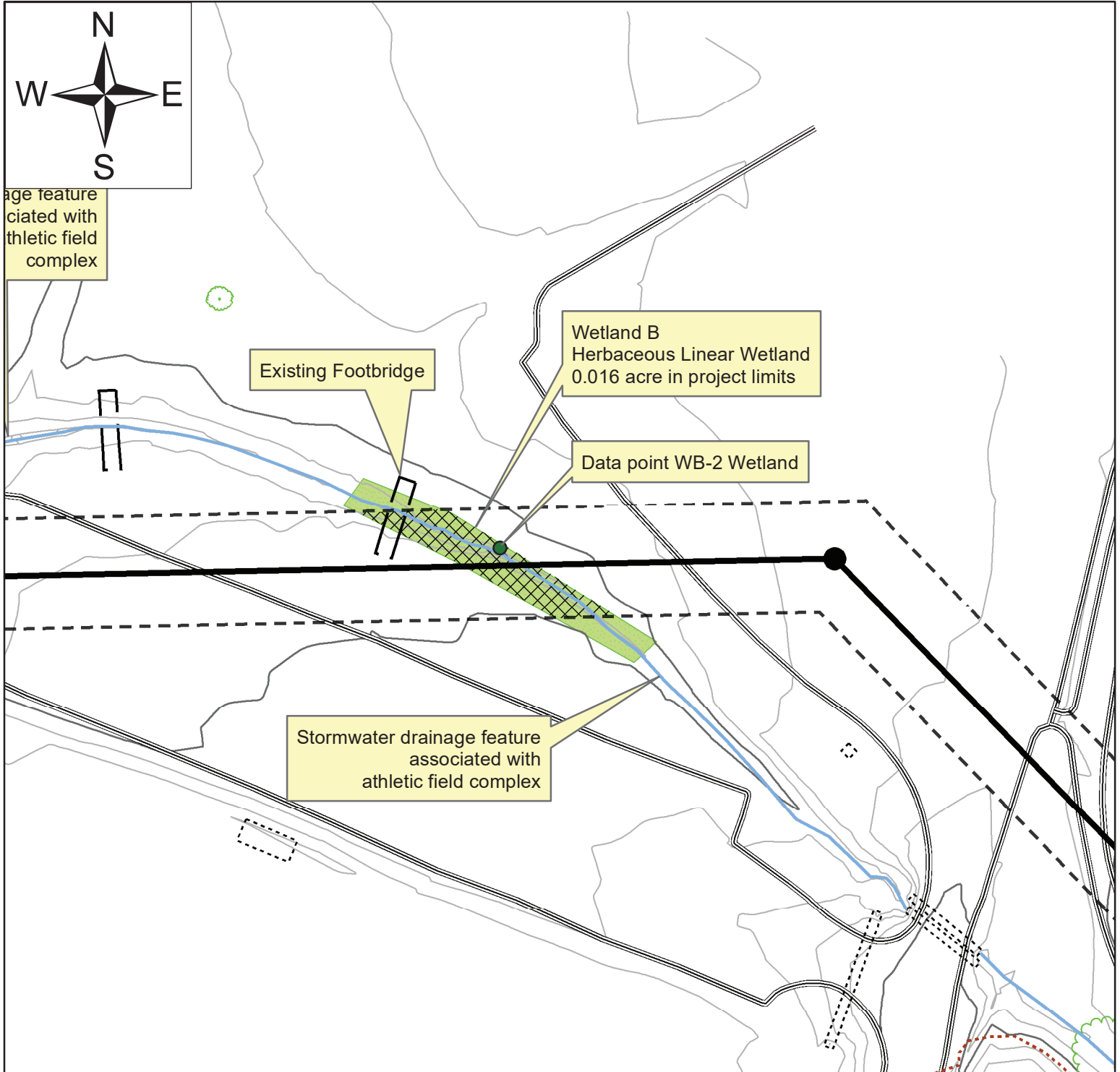
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DELINEATION MAP 4

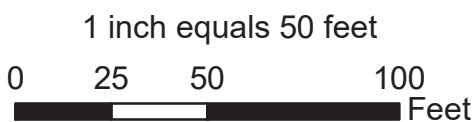
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
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-  100-year Flood Plain
-  Manhole
-  Jurisdictional Wetland
-  Jurisdictional Wetlands in Project Limits



Date: 2/22/2021

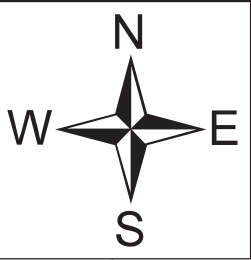
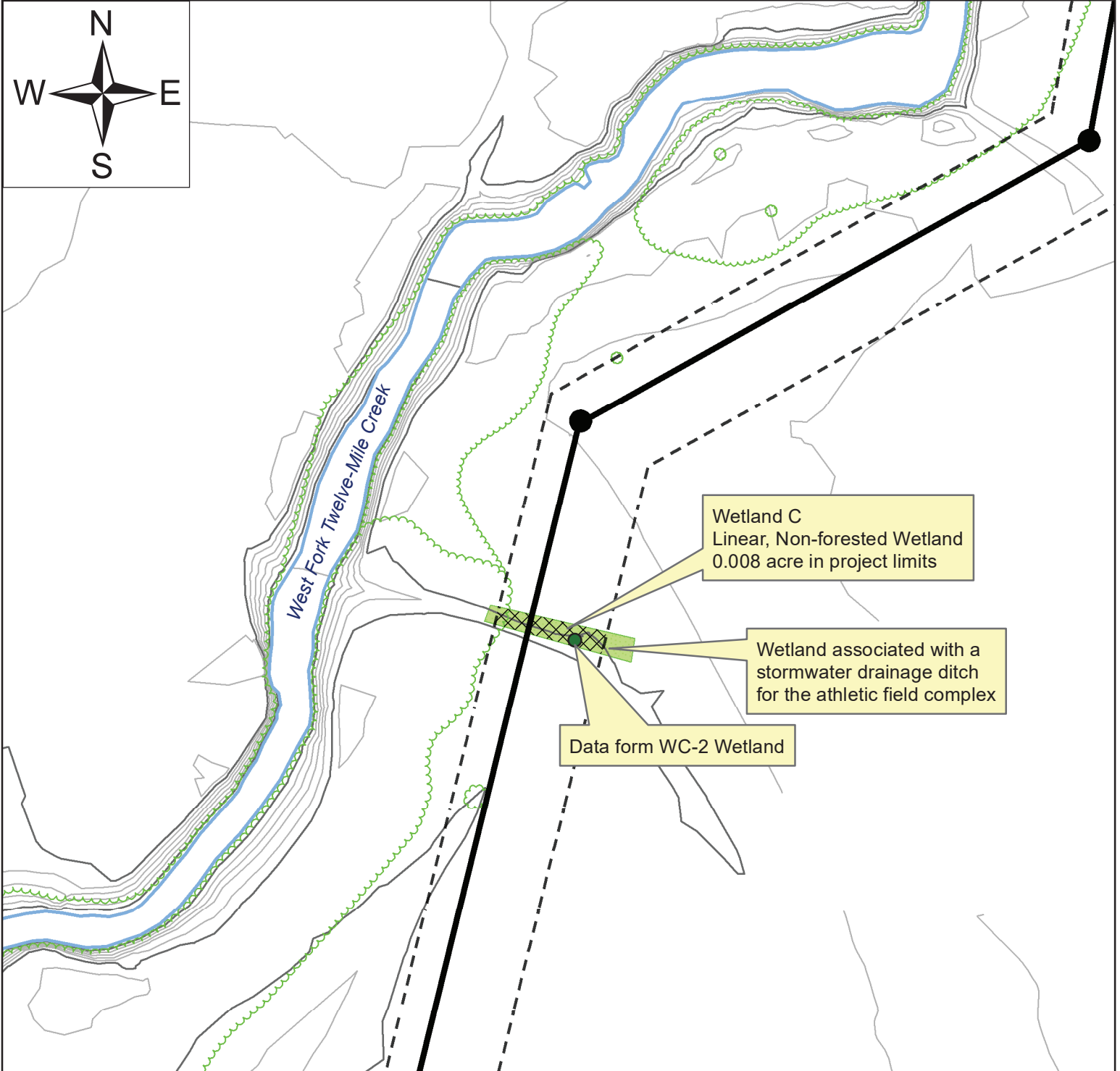


DELINEATION MAP 5

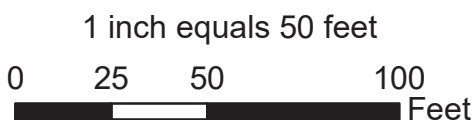
West Fork
Twelve-Mile Creek Interceptor

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  Jurisdictional Wetland
-  Manhole
-  Jurisdictional Wetlands in Project Limits



Date: 2/22/2021

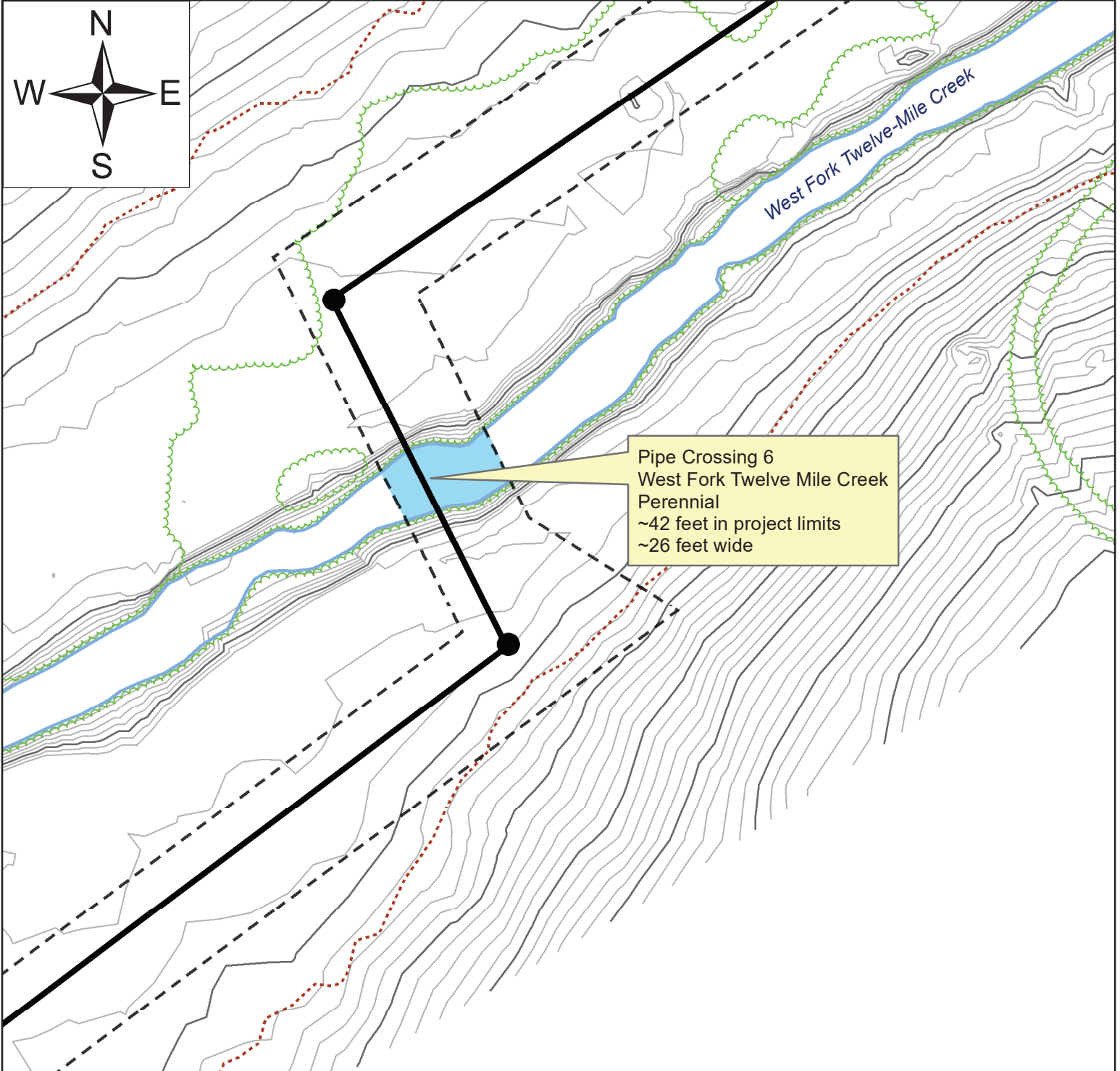


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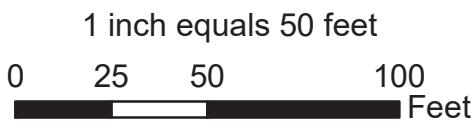
DELINEATION MAP 6

**West Fork
Twelve-Mile Creek Interceptor
Union County, North Carolina**

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



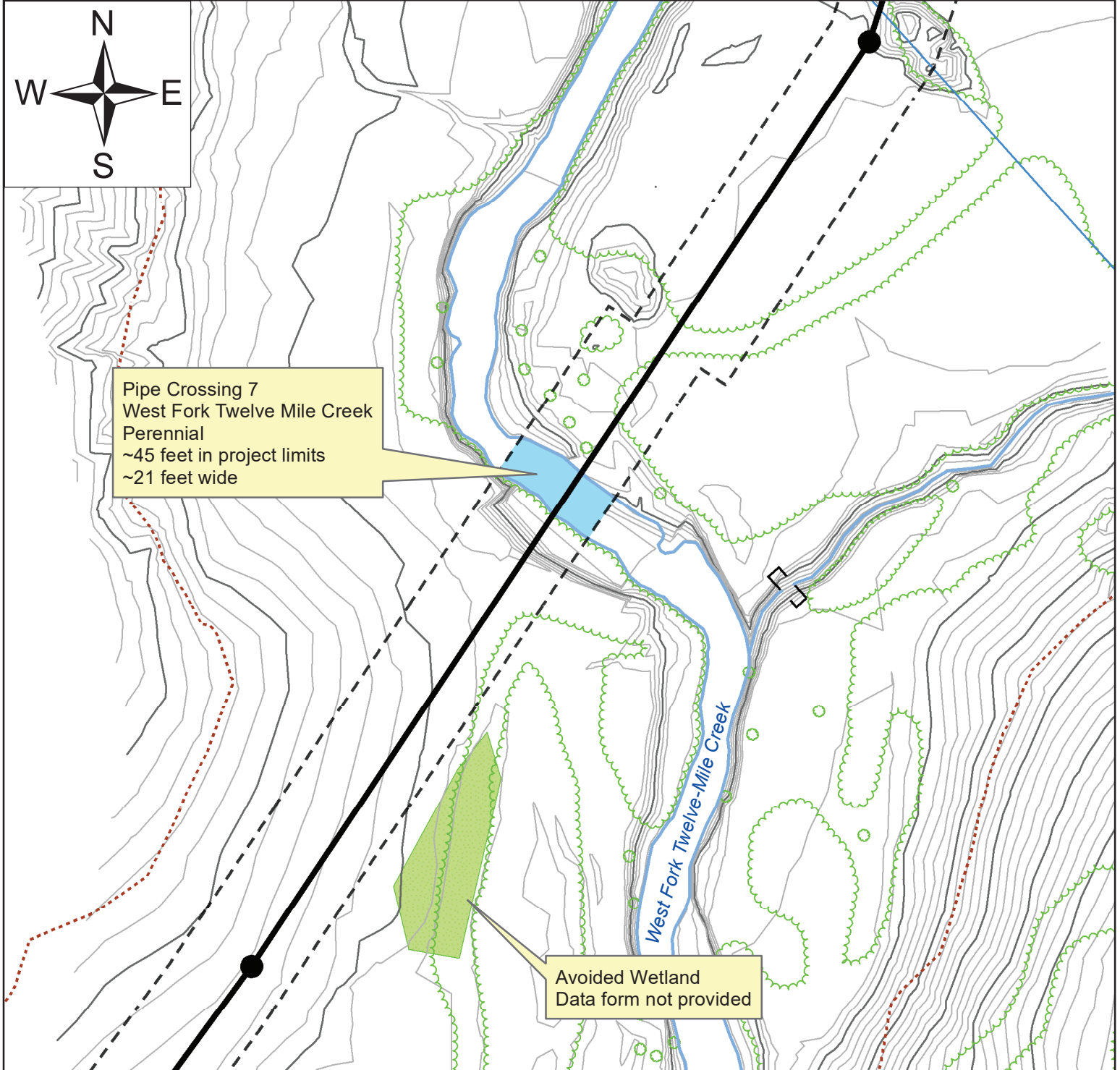
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DELINEATION MAP 7

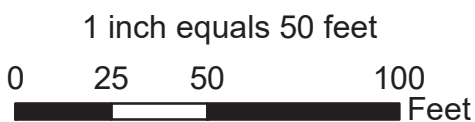
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

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-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



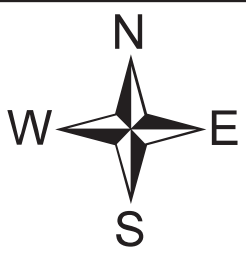
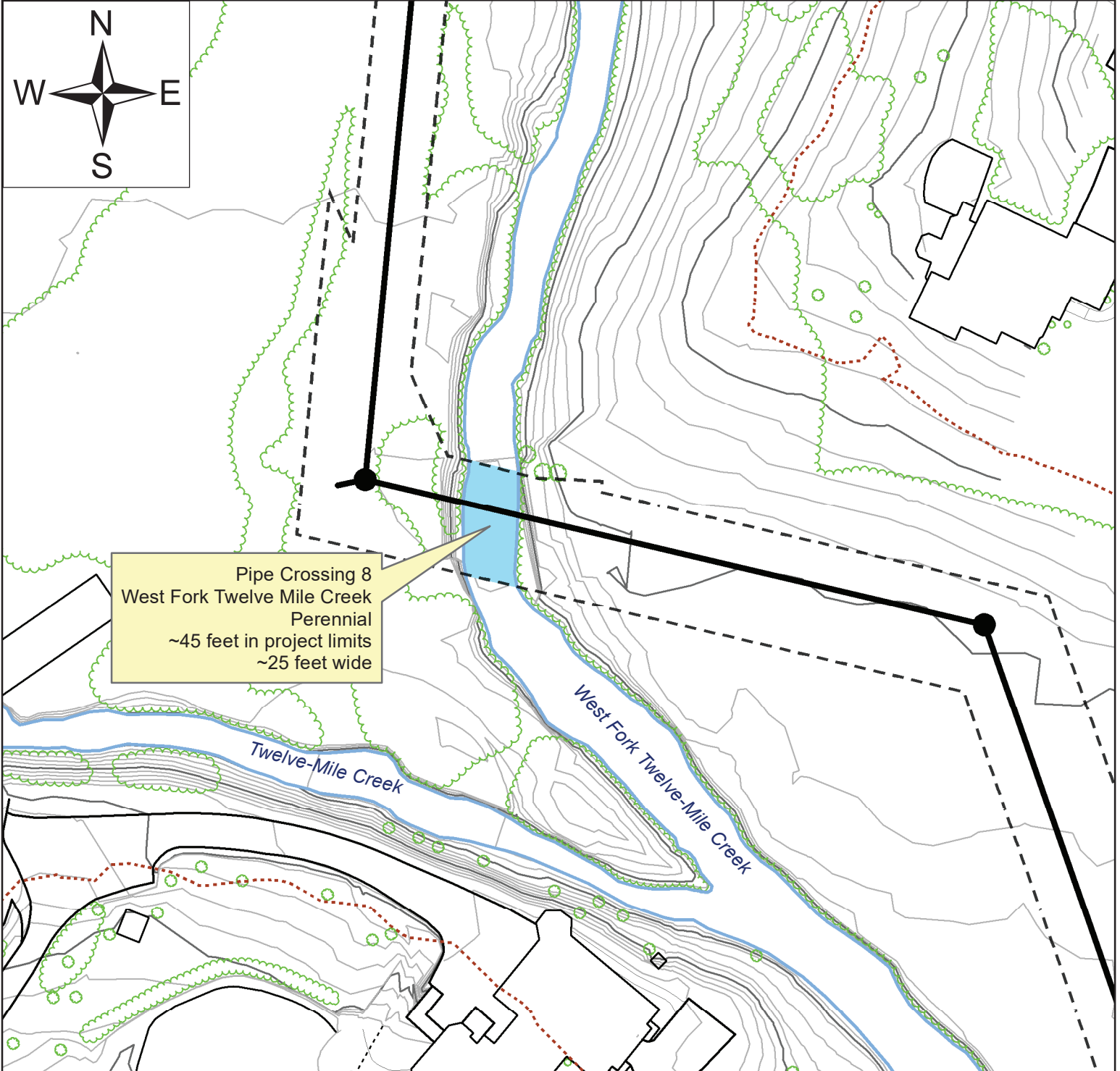
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DELINEATION MAP 8

**West Fork
Twelve-Mile Creek Interceptor**

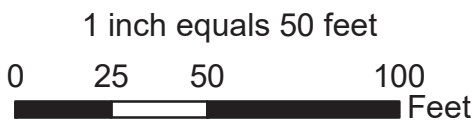
Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Pipe Crossing 8
 West Fork Twelve Mile Creek
 Perennial
 ~45 feet in project limits
 ~25 feet wide

Date: 2/22/2021










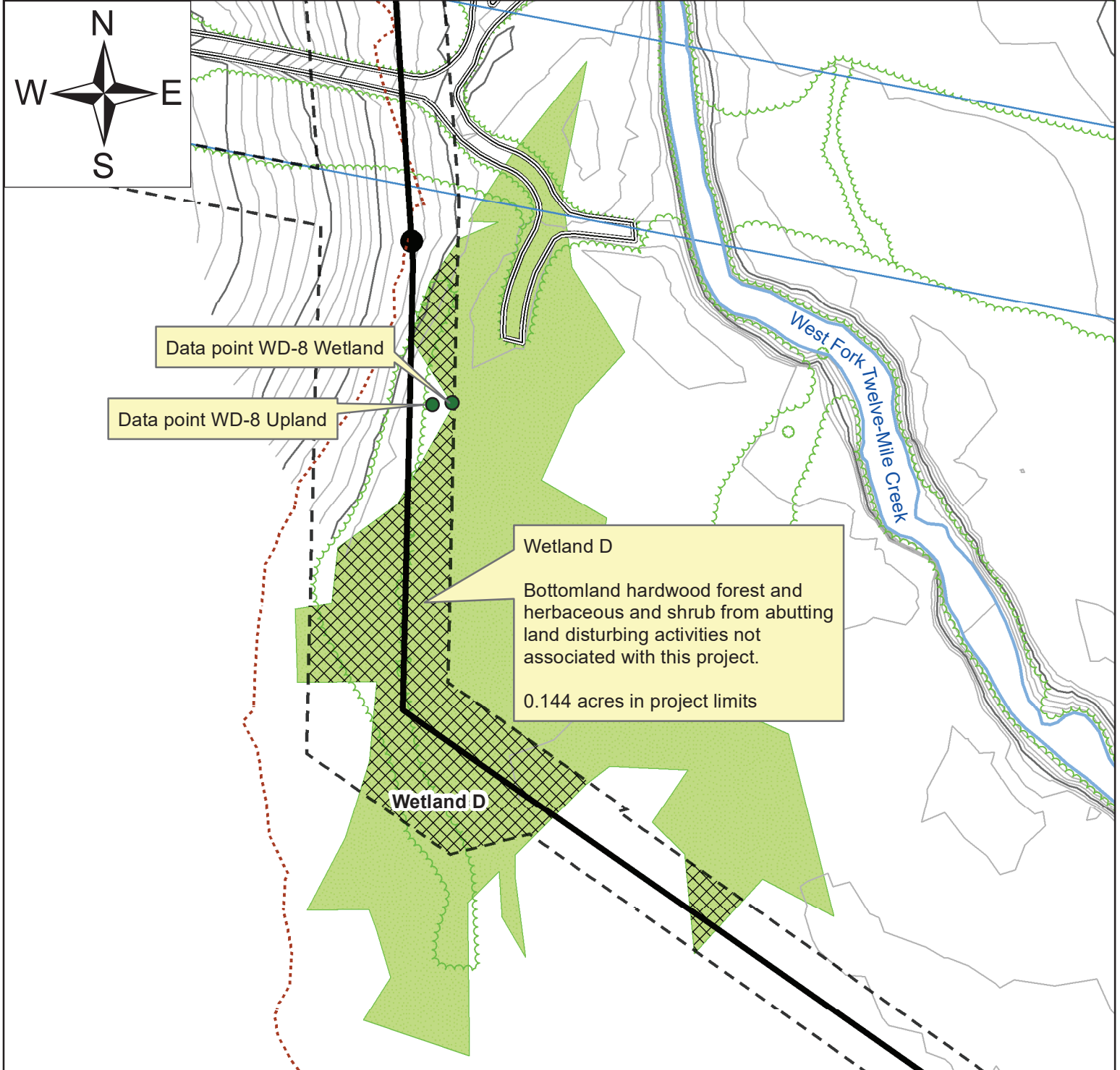
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DELINEATION MAP 9

**West Fork
 Twelve-Mile Creek Interceptor**

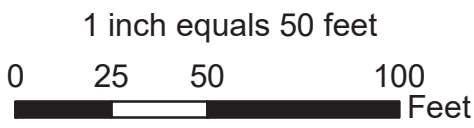
Union County, North Carolina

-  Limits of Disturbance
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-  100-year Flood Plain
-  Manhole
-  Jurisdictional Wetland
-  Jurisdictional Wetlands in Project Limits



Wetland D
 Bottomland hardwood forest and herbaceous and shrub from abutting land disturbing activities not associated with this project.
 0.144 acres in project limits

Date: 2/22/2021









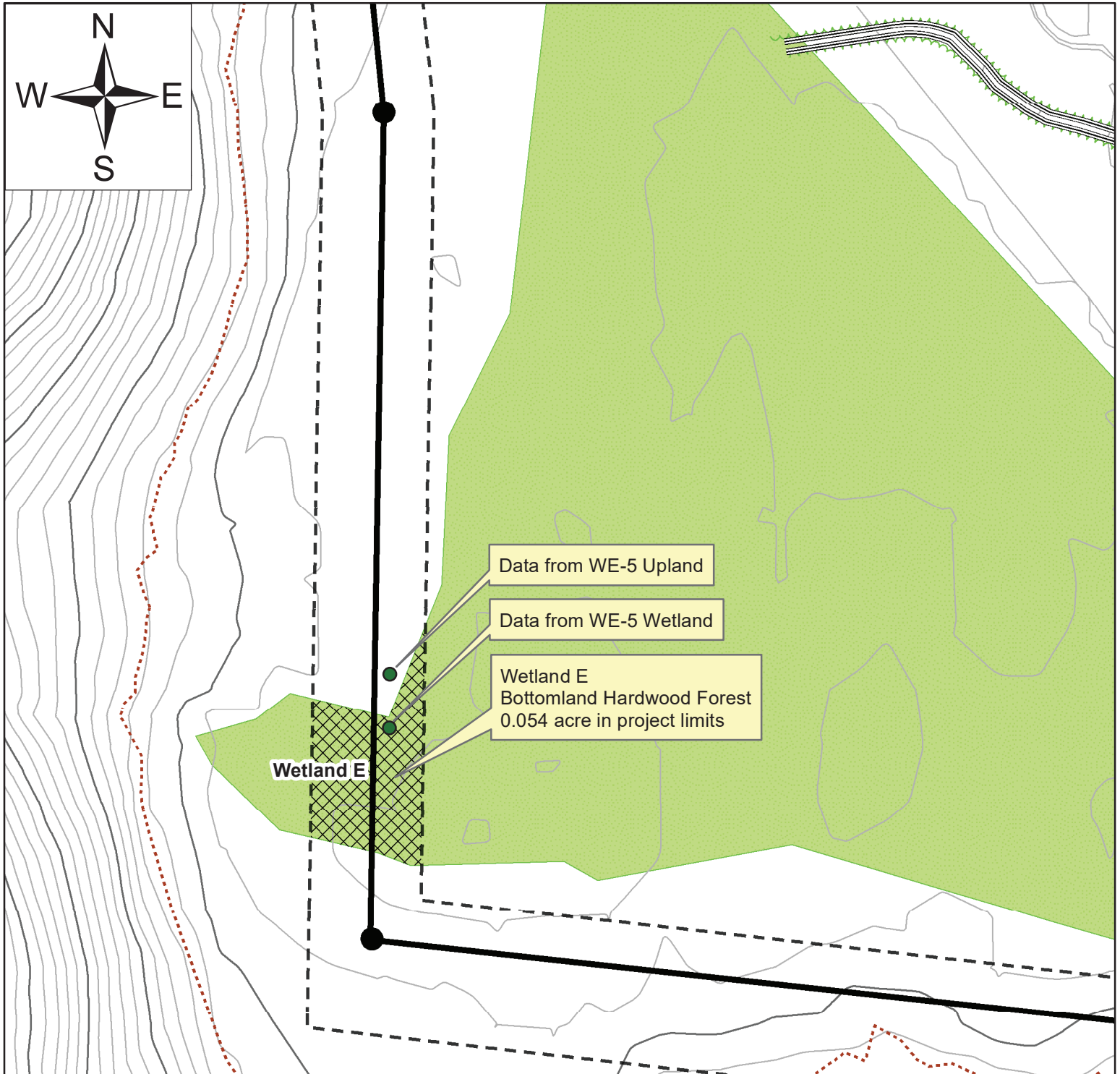
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DELINEATION MAP 10

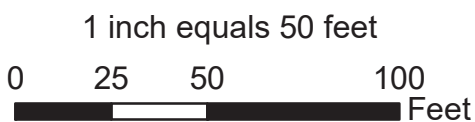
**West Fork
 Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  100-year Flood Plain
-  Anti-seep Collar
-  Jurisdictional Wetland
-  Manhole
-  Jurisdictional Wetlands in Project Limits



Date: 2/22/2021



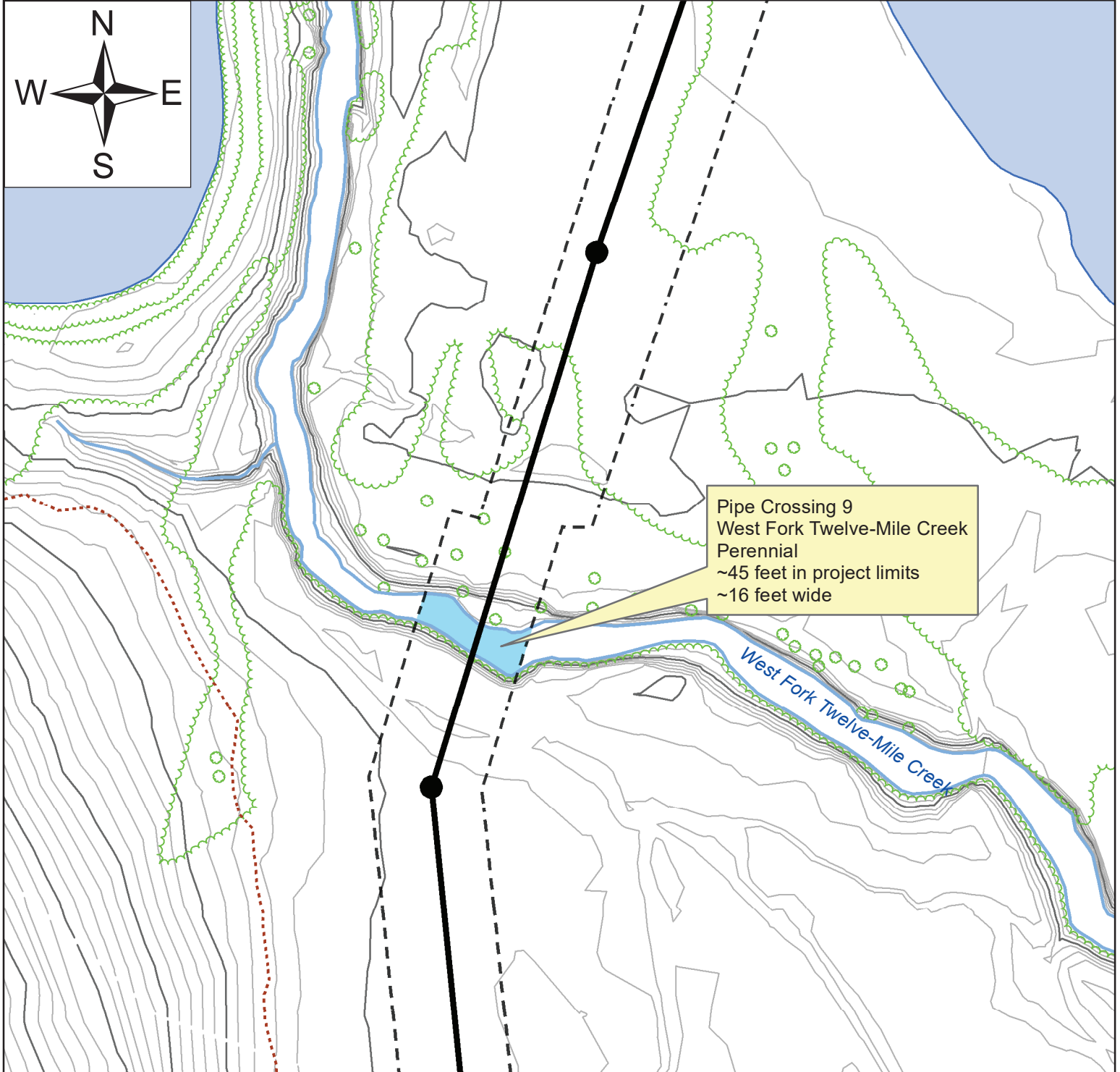
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DELINEATION MAP 11

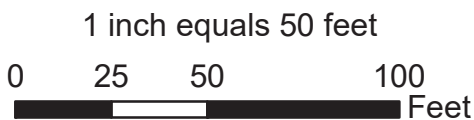
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Pond
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



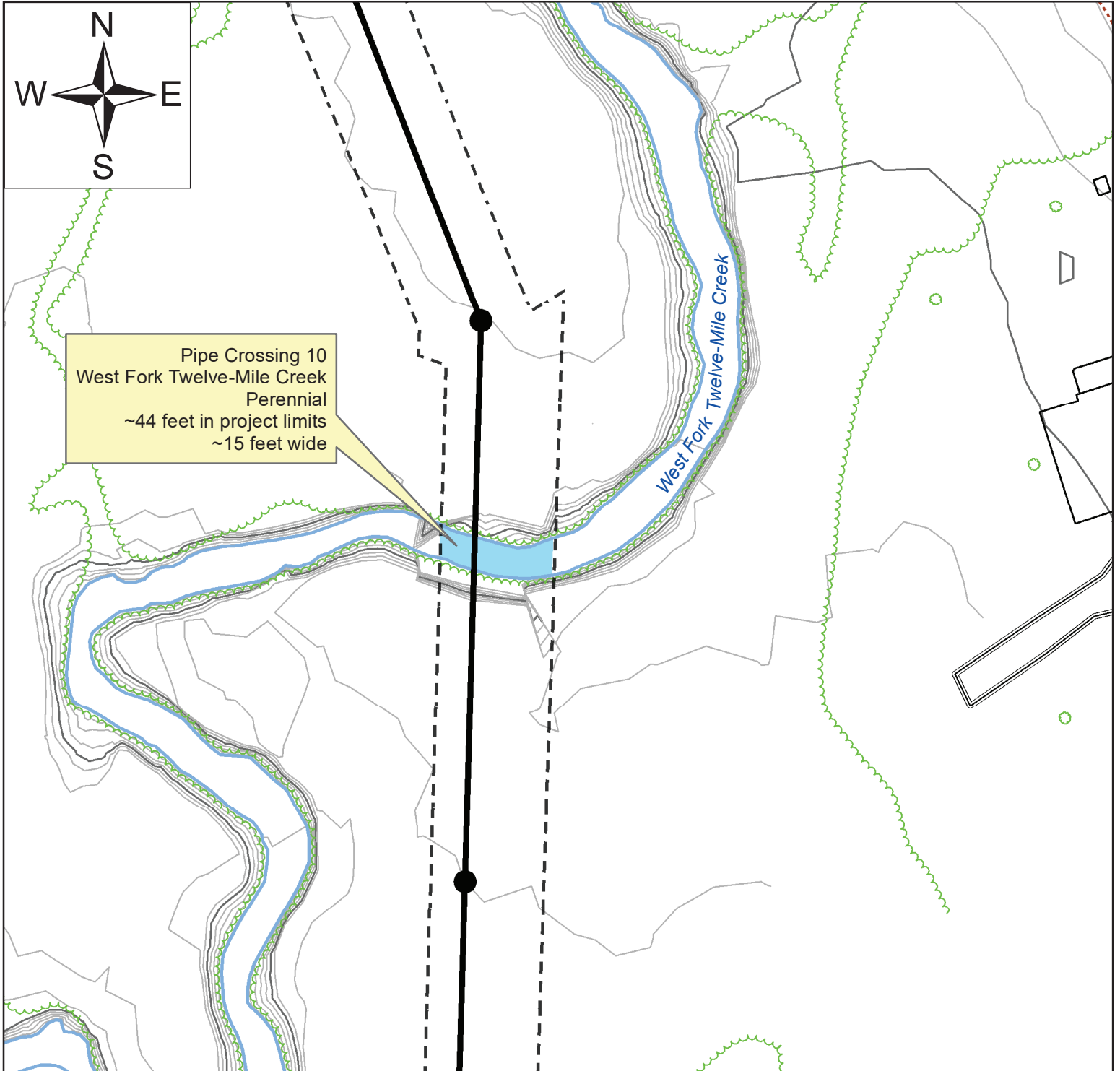
Hazen

DELINEATION MAP 12

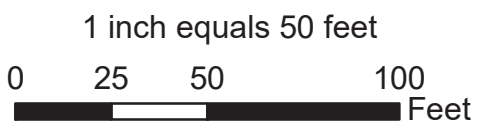
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021




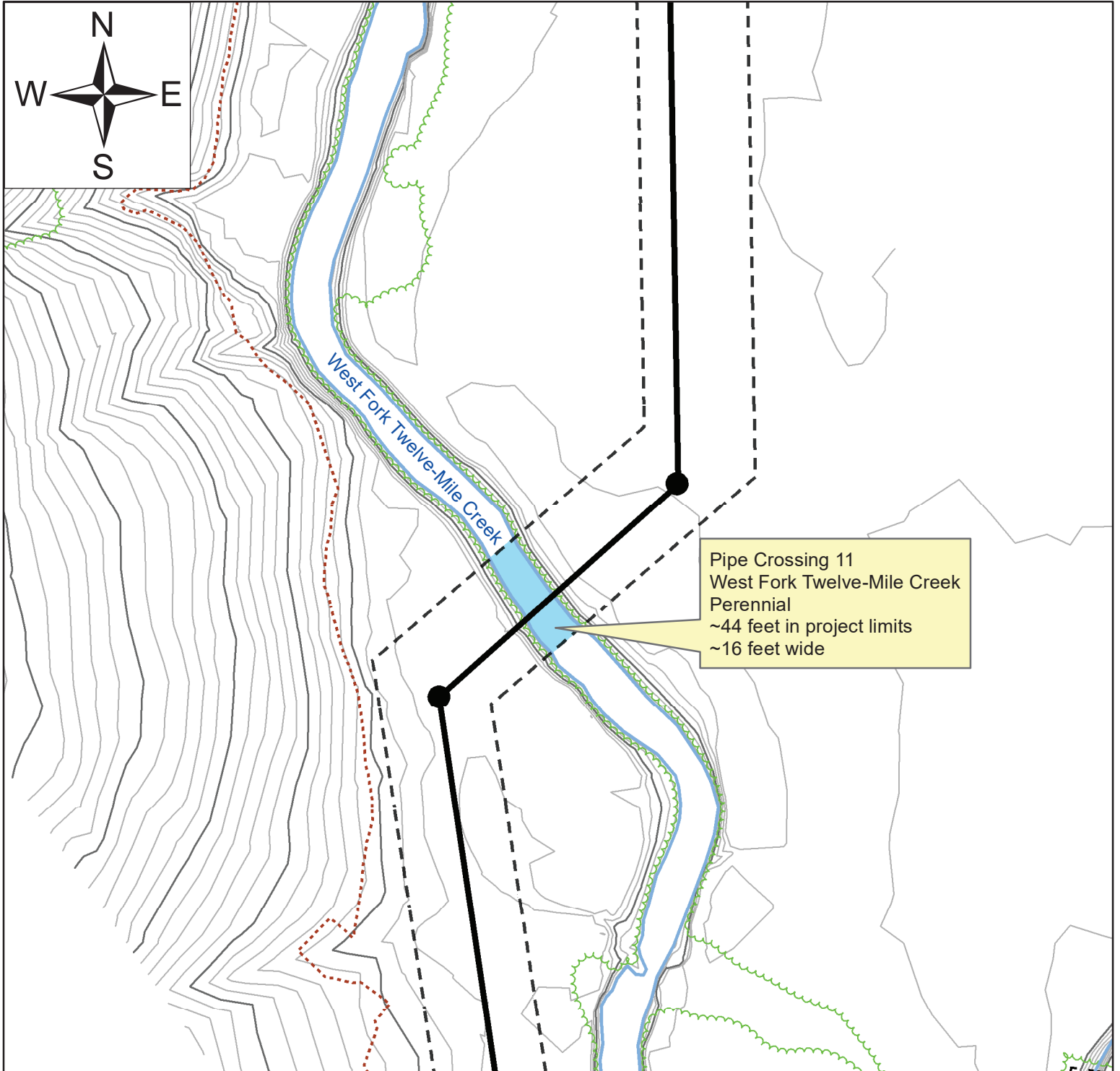
Hazen

DELINEATION MAP 13

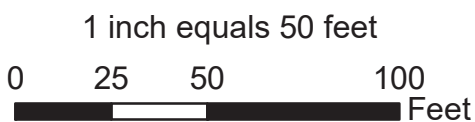
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



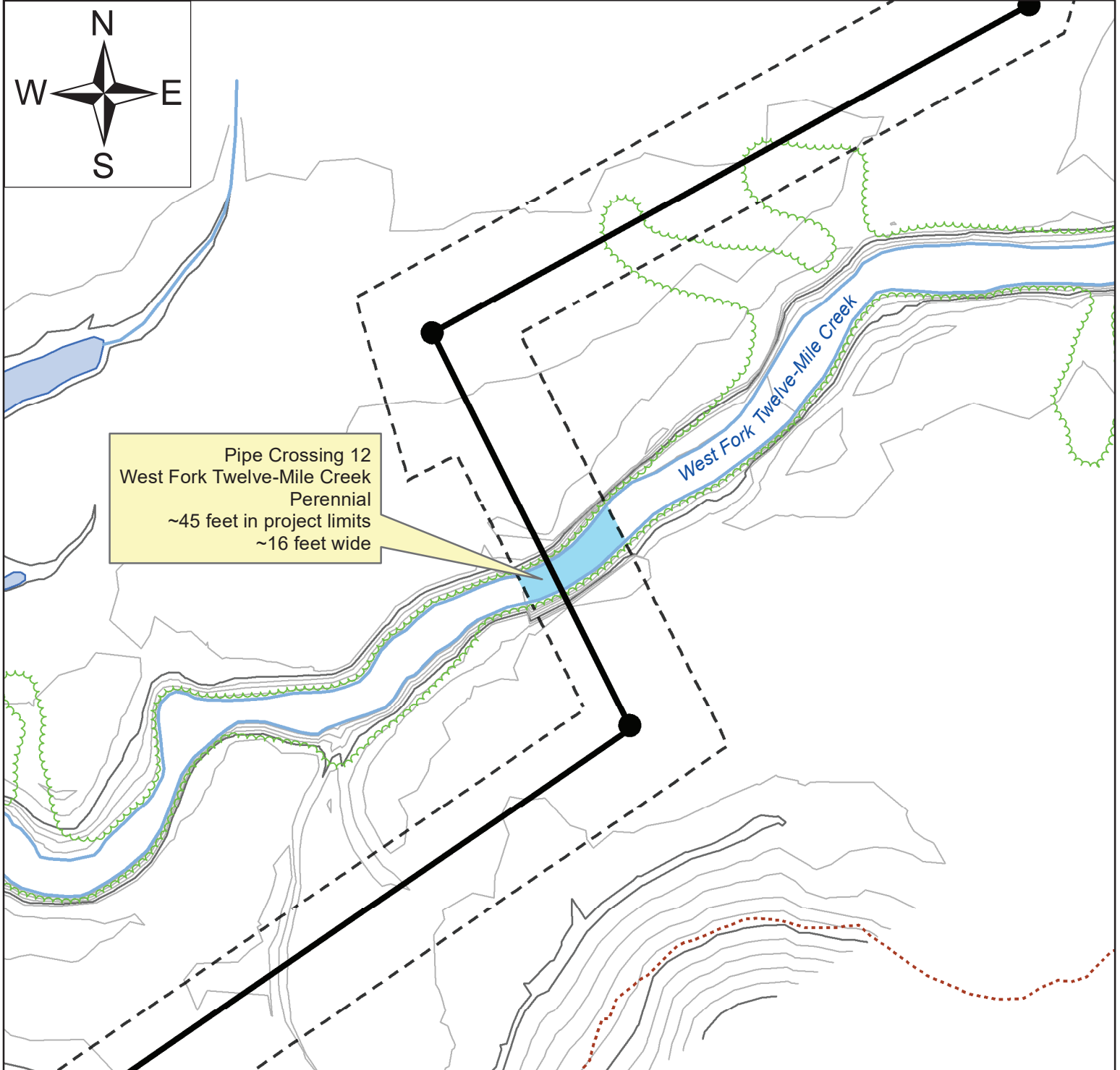
Hazen

DELINEATION MAP 14

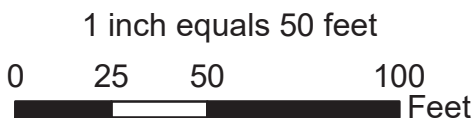
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Pond
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



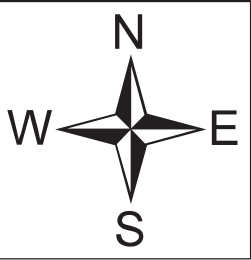
Hazen

DELINEATION MAP 15

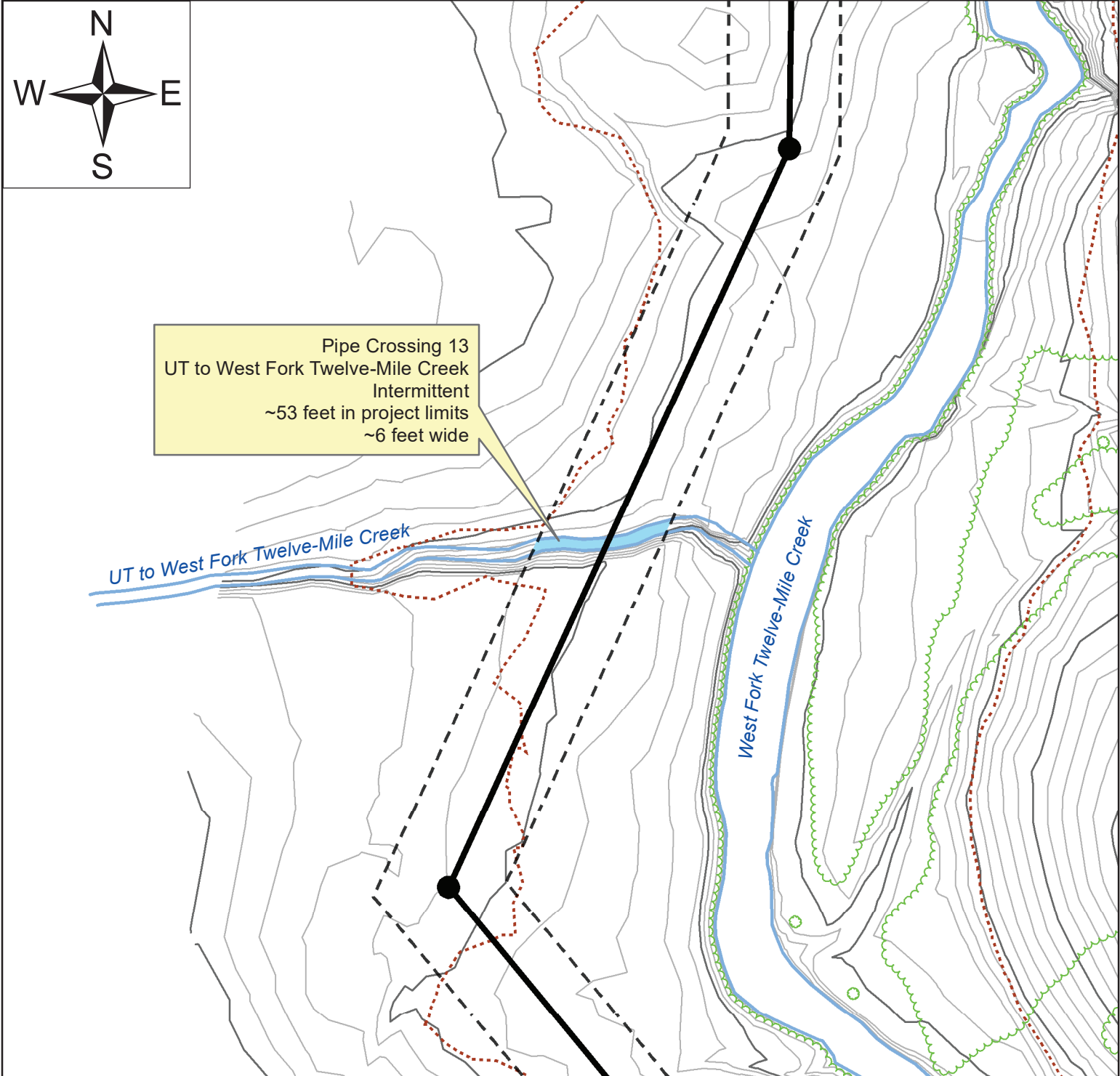
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

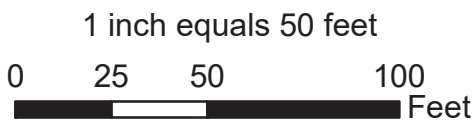
-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Pipe Crossing 13
 UT to West Fork Twelve-Mile Creek
 Intermittent
 ~53 feet in project limits
 ~6 feet wide



Date: 2/22/2021



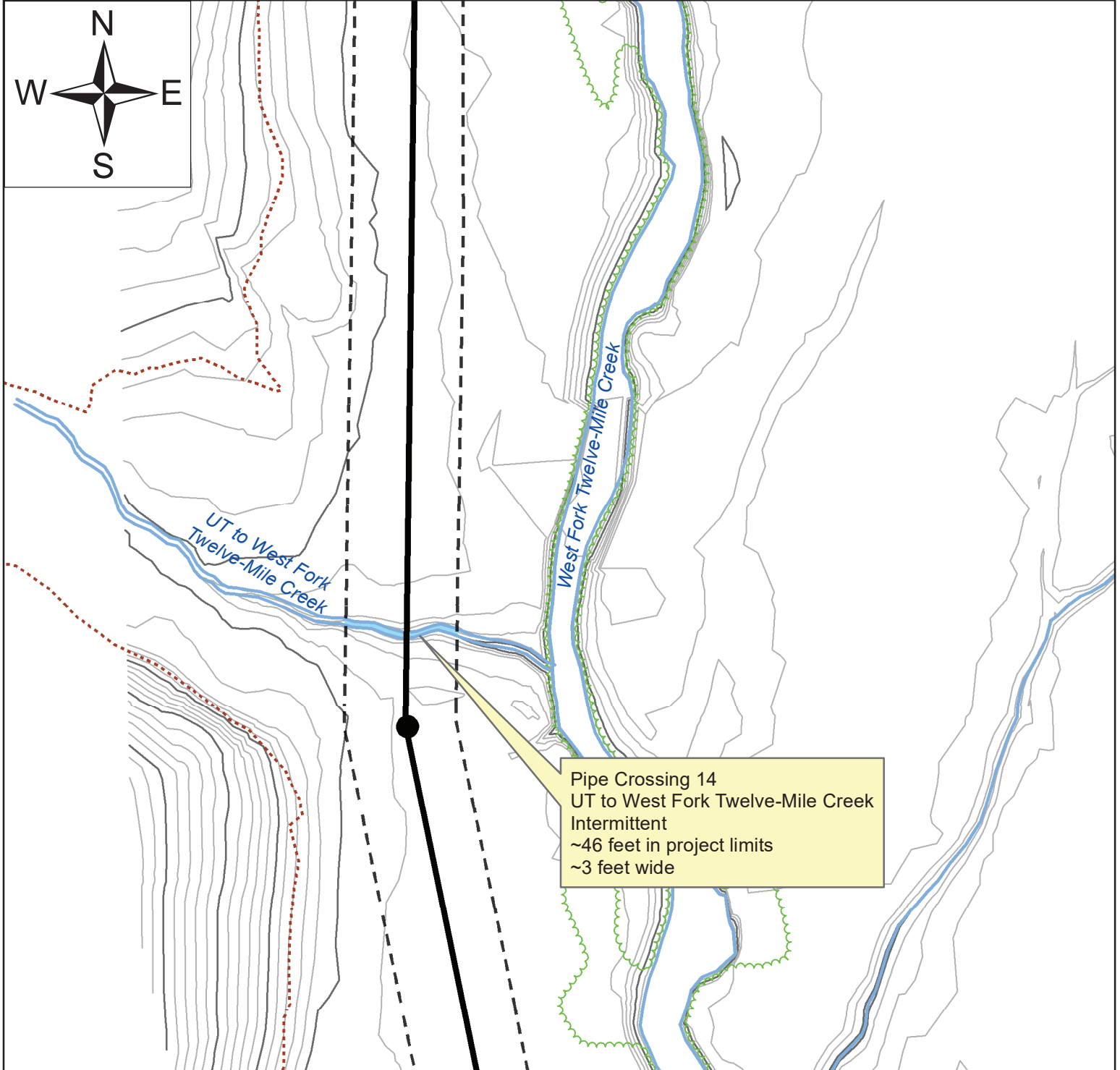
Hazen

DELINEATION MAP 16

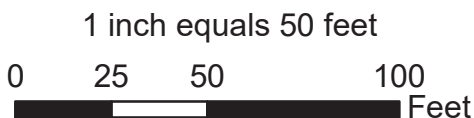
**West Fork
 Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



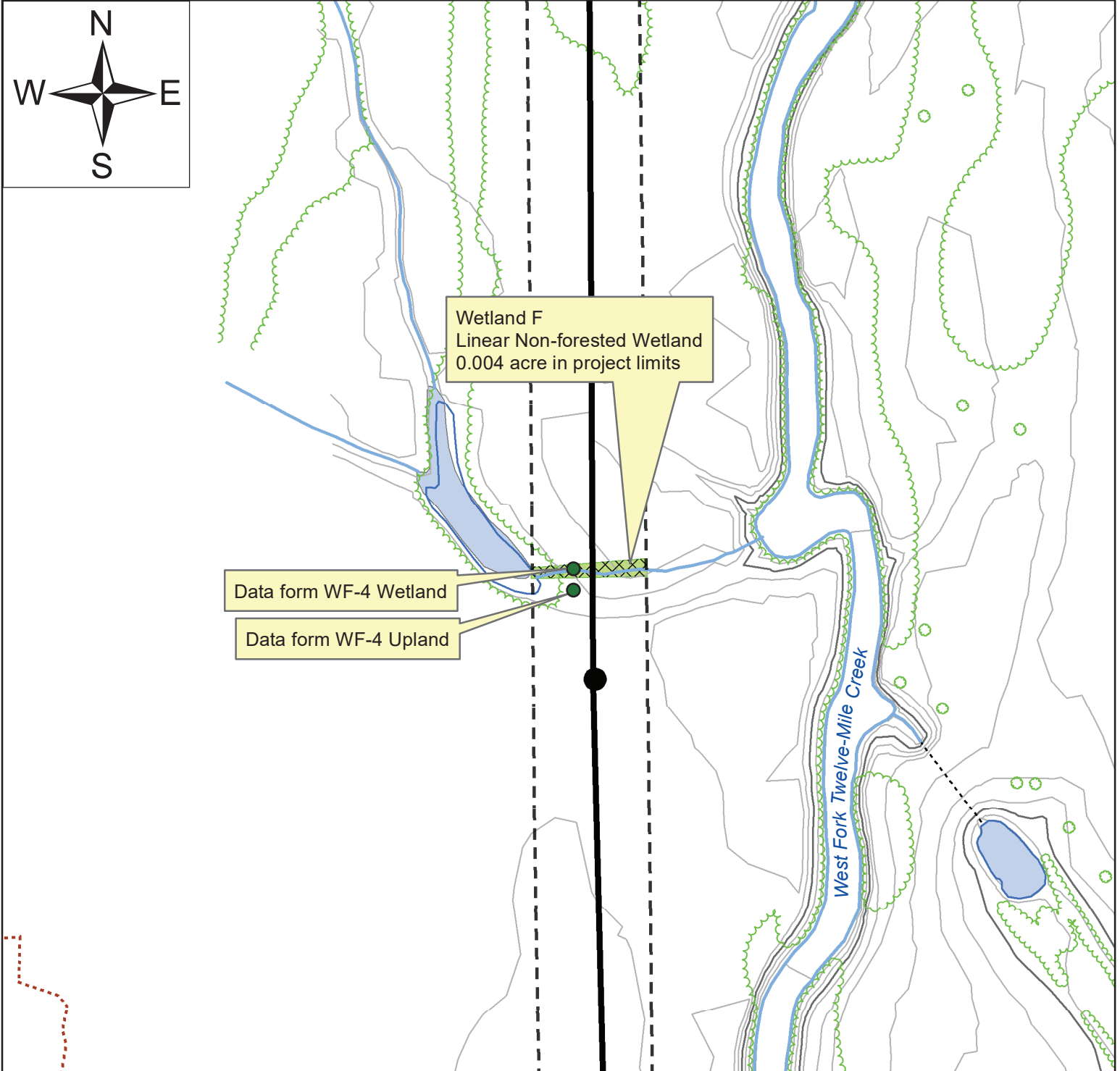
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DELINEATION MAP 17

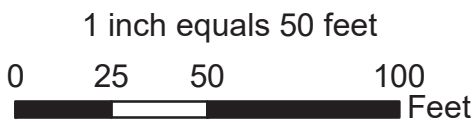
**West Fork
 Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Pond
-  Jurisdictional Wetland
-  Jurisdictional Wetlands in Project Limits



Date: 2/22/2021



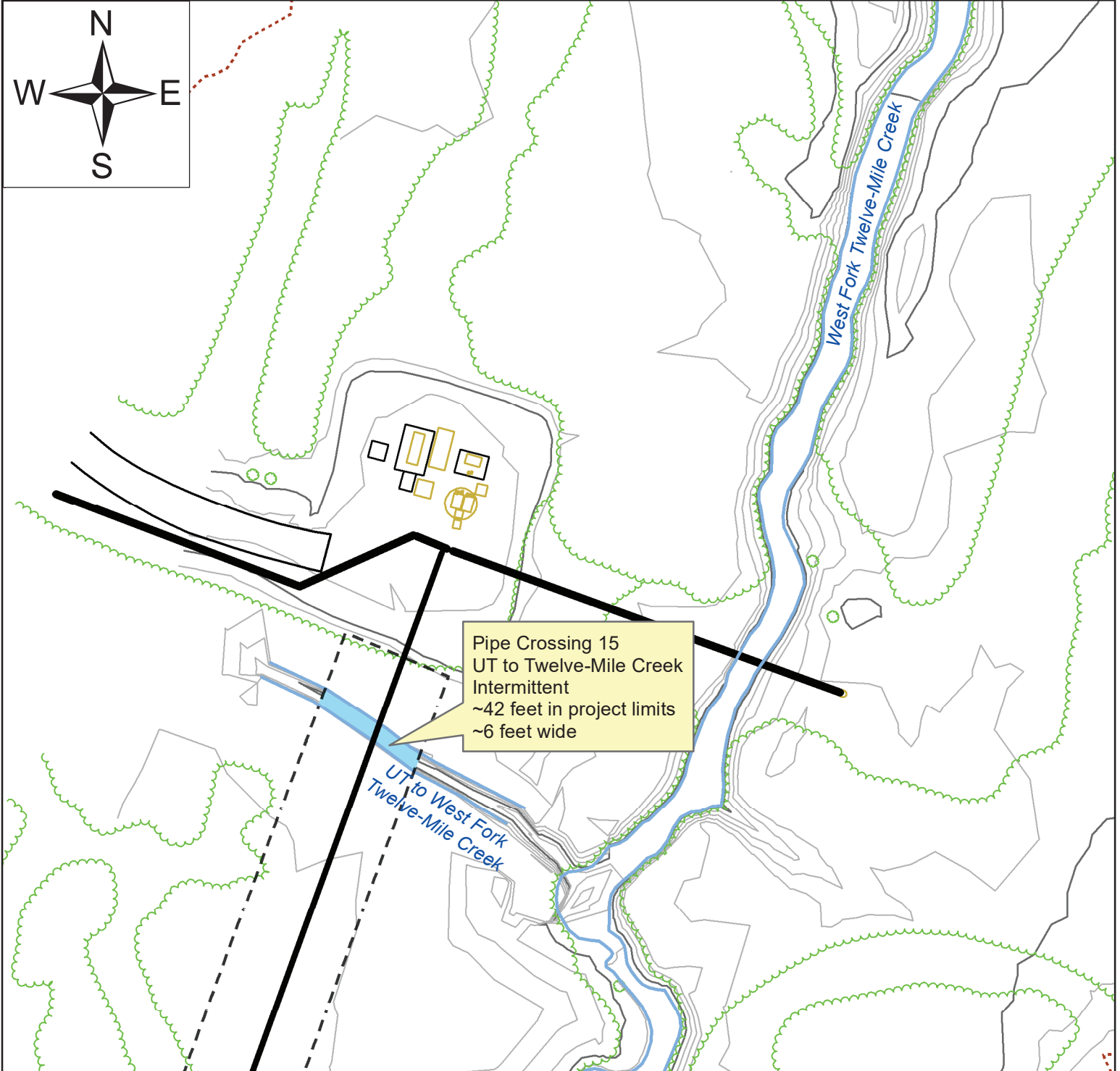
Hazen

DELINEATION MAP 18

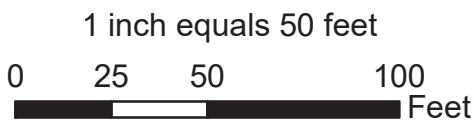
**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

-  Limits of Disturbance
-  Stream
-  Anti-seep Collar
-  100-year Flood Plain
-  Manhole
-  Jurisdictional Stream in Project Limits



Date: 2/22/2021



Hazen

DELINEATION MAP 19

**West Fork
Twelve-Mile Creek Interceptor**

Union County, North Carolina

NCDEQ Sedimentation and Erosion Control Permit

Thomas, Lisa

From: Khan, Zahid <zahid.khan@ncdenr.gov>
Sent: Sunday, March 7, 2021 11:40 AM
To: Mierzejewski, Ellie
Subject: RE: [External] UNION-2018-106 Extension Request

Extension granted up to Dec. 31, 2021. Thanks

From: Mierzejewski, Ellie [mailto:emierzejewski@hazenandsawyer.com]
Sent: Thursday, February 25, 2021 10:54 AM
To: Eplin, Tamera <tamera.eplin@ncdenr.gov>
Cc: Khan, Zahid <zahid.khan@ncdenr.gov>
Subject: RE: [External] UNION-2018-106 Extension Request

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Thank you! Mr. Khan, please let me know if there is additional documentation you require for the extension.

Thanks,

Ellie Mierzejewski, PE, ENV SP

Engineer | Hazen and Sawyer
9101 Southern Pine Blvd, Ste. 250, Charlotte NC 28273
704-357-3150 (main) | 704-941-6056 (direct) | **804-332-0789 (cell)**
emierzejewski@hazenandsawyer.com | hazenandsawyer.com

From: Eplin, Tamera <tamera.eplin@ncdenr.gov>
Sent: Thursday, February 25, 2021 10:53 AM
To: Mierzejewski, Ellie <emierzejewski@hazenandsawyer.com>
Cc: Khan, Zahid <zahid.khan@ncdenr.gov>
Subject: RE: [External] UNION-2018-106 Extension Request

Caution! *External email – think before you click*

Ellie,

I now serve the Winston-Salem Region of DEMLR, so I'm forwarding your email to Zahid Khan.

Regards,

Tamera Eplin, PE
Regional Engineer

Land Quality Section, Winston-Salem Regional Office
Division of Energy, Mineral and Land Resources
North Carolina Department of Environmental Quality

(336) 776-9800 office
tamera.eplin@ncdenr.gov

450 West Hanes Mill Road, Suite 300
Winston-Salem, NC 27105-7407



Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

Based on the current guidance to minimize the spread of COVID-19, the Department of Environmental Quality has adjusted operations to protect the health and safety of the staff and public. Many employees are working remotely or are on staggered shifts. To accommodate these staffing changes, The Winston-Salem Regional office is presently closed to the public, except by appointment only. We are still accepting mail and reviewing erosion control plans. Temporary modifications to our express review procedures are in effect. Please check with the appropriate staff before visiting our offices, as we may be able to handle your requests by phone or email. We appreciate your patience as we continue to serve the public during this challenging time.

From: Mierzejewski, Ellie <emierzejewski@hazenandsawyer.com>
Sent: Thursday, February 25, 2021 10:51 AM
To: Eplin, Tamera <tamera.eplin@ncdenr.gov>
Subject: [External] UNION-2018-106 Extension Request

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Hello Ms. Eplin,

I would like to request an extension to the UNION-2018-106 permit previously approved on Aug. 9th, 2018 (set to expire Aug. 9th, 2021). This project was put on hold by the county but is slated to begin construction in late 2021. Would it be possible to issue an extension for January 2022? There has been no change to disturbed area.

Thank you,

Ellie Mierzejewski, PE, ENV SP

Engineer | Hazen and Sawyer
9101 Southern Pine Blvd, Ste. 250, Charlotte NC 28273
704-357-3150 (main) | 704-941-6056 (direct) | **804-332-0789 (cell)**
emierzejewski@hazenandsawyer.com | hazenandsawyer.com



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

WILLIAM E (TOBY) VINSON, JR
Interim Director

August 9, 2018

LETTER OF APPROVAL WITH MODIFICATIONS

Union County Department of Public Works
Attention: John Shutak, CIP Program Manager
500 North Main Street, Suite 600
Monroe, North Carolina 28112

RE: Project Name: West Fork Twelve-Mile Creek Interceptor
Acres Approved: 19.6
Project ID: UNION-2018-106
County: Union, City: Monroe
Address: Antioch Church Road
River Basin: Catawba
Stream Classification: Other
Submitted By: Union County Department of Public Works
Date Received by LQS: August 3, 2018
Plan Type: Revised

Dear Mr. Shutak:

This office has reviewed the subject erosion and sedimentation control plan. We find the plan to be acceptable with modifications and hereby issue this letter of Approval with Modifications. The Modifications Required for Approval are listed on the attached page. This plan approval 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.

Please be aware that your project will be covered by the enclosed NPDES Construction Stormwater General Permit NCG010000. Please become familiar with all the requirements and conditions of this permit in order to achieve compliance.

Please be advised that Title 15A NCAC 4B .0118(a) requires that a copy of the approved erosion control plan be on file at the job site. Also, you should consider this letter to give the Notice required by G.S. 113A-61.1(a) of our right of periodic inspection to insure compliance with the approved plan.

Letter of Approval with Modifications
Union County Department of Public Works
August 9, 2018
Page 2 of 3

North Carolina's Sedimentation Pollution Control Program is performance-oriented, requiring protection of existing natural resources and adjoining properties. If, following the commencement of this project, it is determined that 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 have provided. You are requested to file an amended form if there is any change in the information included on the form. 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,



Tamera Eplin, PE, CPESC
Assistant Regional Engineer
Land Quality Section

Enclosures: Certificate of Approval
Modifications Required for Approval
NPDES Permit

c: Hazen and Sawyer
9101 Southern Pine Boulevard, Suite 250
Charlotte, North Carolina 28273

Inspection Department

MODIFICATIONS REQUIRED FOR APPROVAL

Project Name: West Fork Twelve-Mile Creek Interceptor
Project ID: UNION-2018-106
County: Union

Modifications pursuant to applicable North Carolina General Statutes and/or Regulations:

1. Be advised that 401/404 permits/certifications may provide authorization to work in the areas subject to these permits/certifications, but they do not authorize impact beyond the limits of the permits/certifications. Additional measures may be required to limit impact to the creeks and wetlands. The applicant is responsible for the control of sediment on-site. If the approved erosion and sedimentation control measures prove insufficient, the applicant must take those additional steps necessary to stop sediment from leaving the limits of disturbance. [15A NCAC 4B .0115]

Additional Comments:

1. The NCG01 General Permit, as well as NCG01 stabilization requirements, NC DWR List of Approved PAMS/Flocculants, and NCG01 Combined Self-Monitoring Form may be found at: <https://deq.nc.gov/about/divisions/energy-mineral-land-resources/npdes-stormwater-gps>



NPDES Stormwater Discharge Permit for Construction Activities



Technical Bulletin for NCG010000

Revised Aug. 22, 2013

What is this permit?

This is your General Stormwater Permit for Construction Activities, developed to meet federal National Pollutant Discharge Elimination System (NPDES) requirements. It is separate and in addition to your Erosion and Sedimentation Control (E&SC) Plan.

Federal regulations adopted by the U.S. Environmental Protection Agency (EPA) and N.C. Environmental Management Commission require an NPDES stormwater permit for your project. In North Carolina, the EPA has delegated authority to administer the NPDES program to the Department of Environment and Natural Resources.

The E&SC plan approved by the Division of Energy, Mineral and Land (DEMLR), or a delegated local program, contains the core erosion control requirements for your project. The NPDES Stormwater General Permit contains additional requirements related to a broader range of water quality issues. **These permits are related, but separate. Both contain conditions your project site must meet.**

Are there new requirements in this permit?

This General Permit reflects changes made in the federal regulations effective Feb. 1, 2010, that regulate discharges from construction sites. The federal regulations resulted from litigation decisions that mandated construction activities over a certain size must contain additional measures to reduce the amount of wastes and sediment loading that reach the nation's waters.

The Department of Environment and Natural Resources established the Construction General Permit Technical Advisory Group to guide the development of this NPDES permit. A draft permit was available for public review in May 2011, and the final permit became effective on Aug. 3, 2011.

The most notable change in the new permit is a requirement that ground stabilization, such as wheat straw application, be applied within 14 days from the last land-disturbing activity. For steep slopes, that area must be stabilized within 7 days. Please see page 2 of this technical bulletin for more details.

Do I need to submit a Notice of Intent to have coverage under this permit?

No. Your project is covered by this permit upon approval of an adequate erosion and sedimentation control plan that meets requirements for surface dewatering of basins and ground stabilization timeframes.

What does this permit require me to do?

You should read and become familiar with the provisions of this permit. Below is a list of the major requirements, with indications where those differ from the previous Construction Stormwater General Permit.

Erosion and Sediment Control Plan

You must implement the E&SC Plan approved for your project by DEMLR or by a delegated local program. Adherence to that E&SC

Plan is an enforceable component of this General Permit.

Your E&SC plan will identify areas where the more stringent 7- and 14-day ground stabilization requirements apply. See "Ground Stabilization Requirements" on page 2 of this bulletin.

Monitoring and Inspections

- ◆ You must keep a rain gauge on the project site.
- ◆ Dedicated demolition and other waste areas and earthen material

stockpiles must be located at least 50' from storm drains or streams unless no alternative is feasible (new requirement).

- ◆ You must inspect all E&SC measures at least once a week and within 24 hours after any storm event greater than a half-inch (during a 24-hour period). You must take immediate corrective action for any device failure.

- ◆ You must inspect all outlets where stormwater runoff leaves the site and evaluate the effect on nearby streams or wetlands.

(continued on reverse side)

◆ Corrective action must be taken if sediment is deposited off-site or into a stream or wetland, or causes a visible increase in turbidity (cloudiness) of any waterbody.

◆ You must keep records of these inspections and any corrective actions taken.

Operation and Maintenance

You must provide the operation and maintenance necessary to maintain optimal performance of stormwater controls. This means you must take corrective action if erosion and sediment control measures are not operating properly. Operation and maintenance includes, but is not limited to:

- ◆ Regularly cleaning out sedimentation basins.
- ◆ Stabilizing eroded banks,

channels or spillway structures.

- ◆ Repairing/clearing out inlets and outlets.
- ◆ Repairing and maintaining storm drainage inlet and outlet protection.
- ◆ Repairing piping, seepage and mechanical damage.
- ◆ Repairing silt fence damage.

Reporting

The self-inspections required by this permit are an opportunity to identify impacts to nearby waters. **If you observe sediment that has deposited in a stream or wetland, you must notify the DEMLR regional office within 24 hours and provide written notice within five days (see #3 on page 6 of the General Permit).**






Non-compliance and Fines

Projects that violate Stormwater Permit conditions and/or have unauthorized water quality impacts are subject to fines. Civil penalties of up to \$25,000 per day for each violation may be assessed.

Inspections

Staff from DEMLR and local programs with delegated authority will perform random inspections of your project site to ensure compliance with state and federal regulation governing construction activities. That means that your project, if found to be in violation, could potentially be subject to enforcement action by both DEMLR and the local program. The inspections may be routine in nature or the result of a citizen complaint.

Ground Stabilization Requirements

Site Area Description	Stabilization	Timeframe Exceptions
 Perimeter dikes, swales, ditches and slopes	7 days	None
 High Quality Water (HQW) Zones	7 days	None
 Slopes steeper than 3:1	7 days	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed.
 Slopes 3:1 or flatter	14 days	7 days for slopes greater than 50' in length.
 All other areas with slopes flatter than 4:1	14 days	None, except for perimeters and HQW Zones.

Additional information is available online:



- NC Stormwater Permitting <http://portal.ncdenr.org/web/lr/stormwater>
- NCG01 Permit Information <http://portal.ncdenr.org/web/lr/construction-stormwater>
- Map of Regional Offices <http://portal.ncdenr.org/web/lr/division-contacts>

Still have questions? Call the DEMLR Regional Office nearest your project's location:

Asheville Office	(828) 296-4500	Washington Office	(252) 946-6481
Fayetteville Office	(910) 433-3300	Wilmington Office	(910) 796-7215
Mooresville Office	(704) 663-1699	Winston-Salem Office	(336) 771-5000
Raleigh Office	(919) 791-4200	Central Office	(919) 707-9220

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER QUALITY
GENERAL PERMIT – NCG 010000
TO DISCHARGE STORMWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
for
CONSTRUCTION ACTIVITIES

In compliance with the provision of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by North Carolina Environmental Management Commission and the Federal Water Pollution Control Act as amended:

All owners or operators of stormwater point source discharges associated with construction activities including clearing, grading or excavation activities resulting in the disturbance of land greater than or equal to one acre, or that are part of a common plan of development of that size, are hereby authorized to discharge stormwater to the surface waters of North Carolina or to a separate storm sewer system conveying stormwater to the surface waters in accordance with the terms and conditions set forth herein. Failure to receive coverage under this permit or violations of any of the conditions listed may result in assessment of state or federal civil or criminal penalties for each day of violation.

The General Permit shall become effective on August 3, 2011.
The General Permit shall expire at midnight on July 31, 2016.

Signed this day July 28, 2011

Original signed by Coleen Sullins

Coleen H. Sullins, Director
Division of Water Quality
By the Authority of the Environmental Management Commission

TABLE OF CONTENTS

	Page
SECTION I - COVERAGE UNDER THE GENERAL PERMIT	3
SECTION II – STORMWATER POLLUTION PREVENTION REQUIREMENTS	4
Section II.A. - Stormwater Pollution Prevention Requirements in the E&SC Plan	4
Section II.B. - Stormwater Pollution Prevention Requirements in the Construction GP	5
Section II.B.1. - Construction Site Pollutants	5
Section II.B.2. - Ground Stabilization	6
Section II.B.3. - Self Inspection and Reporting Requirements	6
Section II.B.4. - Sediment Basins	8
Section II.B.5. - Discharges to Special or Threatened Waters	8
SECTION III – FRAMEWORK OF PERMIT COVERAGE	8
SECTION IV – OPERATION AND MAINTENANCE OF POLLUTION CONTROLS	10
SECTION V – PERMIT ADMINISTRATION AND COMPLIANCE ISSUES	11
SECTION VI – DISCHARGE MONITORING AND TURBIDITY LIMITATIONS	15
SECTION VII – DEFINITIONS	15
SECTION VIII – DIVISION OF WATER QUALITY CONTACTS	16

SECTION I
COVERAGE UNDER THE GENERAL PERMIT

Until this State of North Carolina General Permit expires or is modified or revoked, the permittee is authorized to discharge stormwater in accordance with the terms and conditions of this permit and in accordance with an approved Erosion and Sedimentation Control Plan by the North Carolina Division of Land Resources, Land Quality Section, or a delegated local program under the provisions and requirements of North Carolina General Statutes in Article 4 of Chapter 113A to the surface waters of North Carolina or to a separate storm sewer system. The permit, along with state statutes (N.C.G.S. 143-215.1) and rules (NCAC 2H .0100) relating to stormwater permitting are designed to work together to assure compliance with the NPDES requirements of the Clean Water Act. Furthermore, North Carolina rules in Title 15A NCAC 2H .0126 adopt by reference the federal stormwater permitting requirements.

Any other point source discharge to surface waters of the state is prohibited unless covered by another permit, authorization or approval. The discharges allowed by this General Permit shall not cause or contribute to violations of North Carolina Water Quality Standards for surface waters and wetlands (15A NCAC 2B .0200). Discharges allowed by this permit must meet all applicable water quality certification or permit requirements as outlined in 15A NCAC 2H .0500 and 2H .1300. This permit does not relieve the permittee from responsibility for compliance with any other applicable federal, state, or local law, rule, standard, ordinance, order, judgment, or decree.

This General Permit is applicable to point source discharges from construction activities disturbing one or more acres of land. The application to the Division of Land Resources or a delegated local program for approval of a local Erosion and Sedimentation Control Plan (E&SC Plan) shall be considered to take the place of a Notice of Intent for coverage under this General Permit for those projects requiring this Permit coverage. Coverage under this General Permit shall become effective upon issuance of an approval for the E&SC Plan by the Division of Land Resources or delegated local program that includes the following:

- a. Designation on the plans where the specific ground stabilization requirements apply as per Section II.B.2 of this permit.
- b. Designs of basins with surface withdrawal as per Section II.B.4 of this permit.

Prior to the commencement of construction and land disturbing activities, approval of the E&SC Plan shall be obtained.

This General Permit revision reflects changes made in the federal regulations effective February 1, 2010. The federal regulations were a result of litigation that mandated that construction activities over a certain size must contain additional specifications that would result in reduced wastes and sediment loading reaching the nation's waters. The Division of Water Quality and the Division of Land Resources established a Construction General Permit Technical Advisory Group (CTAG) to provide them guidance in developing the permit. The CTAG was comprised of 14 members who represented a broad range of environmental, regulatory, government and development interests. A Draft Construction General Permit was prepared and made available for review on May 13, 2011. A public meeting was held on June 7th. This permit reflects the input received during the twelve- month development process.

Any owner or operator not wishing to be covered or limited by this General Permit may apply for an individual NPDES permit in accordance with NPDES procedures in 15A NCAC 2H .0100, stating the reasons supporting the request. Any application for an individual permit should be made at least 180 days prior to the time the permit is needed unless waived, by the Director.

This General Permit does not cover activities or discharges covered by an individual NPDES permit until the individual permit has expired or has been rescinded. Any person conducting an activity covered by an

individual permit but which could be covered by this General Permit may request that the individual permit be rescinded and coverage under this General Permit be provided.

The Division of Water Quality partners with the Division of Land Resources to implement a complete program for construction site coverage that includes state sedimentation control and NPDES stormwater control. The Division of Land Resources implements their control programs through an Erosion and Sedimentation Control Plan (E&SC Plan) issued for each construction site in the state disturbing one or more acres of land. An E&SC Plan is required for each site by the Division of Land Resources or a delegated local government program. The NPDES Construction Stormwater permit (NCG010000) is attached to Erosion and Sedimentation Control Plan approvals. The permittee is responsible for abiding by the conditions of both of these documents.

The Sedimentation Pollution Control Act of 1973 places a duty upon the Sedimentation Control Commission to “develop recommended methods of control of sedimentation and prepare and make available for distribution publications and other materials dealing with sedimentation control techniques appropriate for use by persons engaged in land-disturbing activities.” The Sedimentation Control Commission and the Division of Land Resources have adopted the North Carolina Erosion and Sediment Control Planning and Design Manual as the document to provide that guidance for use at all construction sites in the state. The individual Erosion and Sedimentation Control Plans are developed based on this guidance and become a condition of the Division of Water Quality’s Construction Stormwater General Permit. As provided in this permit, “deviation from the approved E&SC Plan, or approved amendment to that plan, shall constitute a violation of the terms and conditions of this general permit.”

SECTION II STORMWATER POLLUTION PREVENTION REQUIREMENTS

The State construction-related stormwater pollution prevention program provides for: (a) identification of the potential sources of stormwater pollution at the individual construction site; (b) description of the stormwater control measures to reduce or eliminate pollutants in stormwater discharges from the construction site; and (c) identification of the procedures the operator will implement to comply with the terms and conditions of this general permit and the Erosion and Sedimentation Control Plan (E&SC Plan). In North Carolina, the approved **Erosion and Sedimentation Control Plan** for the site, and the **NCG01 Construction General Permit** are considered the **Stormwater Pollution Prevention Plan (SWPPP)** for that site. These two documents, and any specifically-added water quality conditions for that site, contain the provisions necessary to meet the federal regulatory requirements of the NPDES program including provisions implementing the Effluent Limitations Guidelines effective at the time of this permit.

SECTION II.A. - STORMWATER POLLUTION PREVENTION REQUIREMENTS IN THE EROSION AND SEDIMENTATION CONTROL PLAN

The Erosion and Sedimentation Control program is mandated and funded according to state statutes. The majority of the technology-based requirements needed to satisfy the federal stormwater pollution prevention specifications are addressed in the approved E&SC Plan. Each applicant for an E&SC Plan approval is required to comply with a “checklist” of over 50 site-specific conditions*. The categories of these conditions include:

- 1) location information,
- 2) site features,
- 3) control measures,
- 4) drainage features,
- 5) stormwater calculations,
- 6) stabilization,
- 7) ownership information and
- 8) construction sequencing.

*The individual requirements to be addressed in each E&SC Plan application can be found at <http://portal.ncdenr.org/web/lr/erosion> . See “Plan check list for designers.”

SECTION II.B. - STORMWATER POLLUTION PREVENTION REQUIREMENTS IN THE NC CONSTRUCTION GENERAL PERMIT

In addition to the stormwater pollution prevention controls found in the E&SC Plan, this Construction General Permit contains additional conditions that must be met in order to comply with the NPDES program requirements. They are as follows:

1) Construction Site Pollutants

Permittee must manage activities on the site such that water quality standards are not violated from site activities or allowed discharges. In addition to stream pollution from sediment discharge, other activities on construction and development sites can result in pollutants reaching the state’s waters. EPA has prepared guidance documents that provide best management practices that address many activities. See http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4

The following activities, and others on a site-specific basis, require oversight throughout the construction and development process to assure that all water quality standards are protected:

- a) Equipment Operation and Maintenance - Equipment utilized during the construction activity on a site must be operated and maintained in such a manner as to prevent the potential or actual pollution of the surface or ground waters of the state. Fuels, lubricants, coolants, and hydraulic fluids, or any other petroleum products, shall not be discharged onto the ground or into surface waters. Spent fluids shall be cleaned up and disposed of in a manner so as not to enter the waters, surface or ground, of the state and in accordance with applicable state and federal regulations.
- b) Material Handling - Herbicide, pesticide, and fertilizer usage during the construction activity shall be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act and shall be in accordance with label restrictions.
- c) Building Material Waste Handling
 - i) All wastes composed of building materials shall be disposed of in accordance with North Carolina General Statutes, Chapter 130A, Article 9 - Solid Waste Management, and rules governing the disposal of solid waste (North Carolina Administrative Code Section 15A NCAC 13B).
 - ii) Locate areas dedicated for management of land clearing and demolition debris, construction and domestic waste, and hazardous or toxic waste. This location shall be at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available.
 - iii) Dumping of paint and other liquid building material wastes in storm drains is prohibited.
 - iv) Litter and Sanitary Waste - The permittee shall control the management and disposal of litter and sanitary waste from the site.
- d) Location of Stock Piles - Locate earthen-material stock pile areas at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available.
- e) Handling of Concrete
 - i) Concrete materials onsite, including excess concrete, must be controlled and managed to avoid contact with surface waters, wetlands or buffers. No concrete or cement slurry shall be discharged from the site. (Note that discharges from onsite concrete plants require coverage under a separate NPDES permit – NCG140000.)
 - ii) Any hardened concrete residue will be disposed of, or recycled on site, in accordance with local and state solid waste regulations.

2) Ground Stabilization

- a) Soil stabilization shall be achieved on any area of a site where land-disturbing activities have temporarily or permanently ceased according to the following schedule:
 - i) All perimeter dikes, swales, ditches, perimeter slopes and all slopes steeper than 3 horizontal to 1 vertical (3:1) shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 7 calendar days from the last land-disturbing activity.
 - ii) All other disturbed areas shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 14 calendar days from the last land-disturbing activity.
- b) Conditions - In meeting the stabilization requirements above, the following conditions or exemptions shall apply:
 - i) Extensions of time may be approved by the permitting authority based on weather or other site-specific conditions that make compliance impracticable.
 - ii) All slopes 50' in length or greater shall apply the ground cover within 7 days except when the slope is flatter than 4:1. Slopes less than 50' shall apply ground cover within 14 days except when slopes are steeper than 3:1, the 7 day-requirement applies.
 - iii) Any sloped area flatter than 4:1 shall be exempt from the 7-day ground cover requirement.
 - iv) Slopes 10' or less in length shall be exempt from the 7-day ground cover requirement except when the slope is steeper than 2:1.
 - v) Although stabilization is usually specified as ground cover, other methods, such as chemical stabilization, may be allowed on a case-by-case basis.
 - vi) For portions of projects within the Sediment Control Commission-defined "High Quality Water Zone" (15A NCAC 04A. 0105), stabilization with ground cover shall be achieved as soon as practicable but in any event on all areas of the site within 7 calendar days from the last land-disturbing act.
 - vii) Portions of a site that are lower in elevation than adjacent discharge locations and are not expected to discharge during construction may be exempt from the temporary ground cover requirements if identified on the approved E&SC Plan or added by the permitting authority.

3) Self Inspection and Reporting Requirements

Minimum self inspection and reporting requirements are as follows unless otherwise approved in writing by the Division of Water Quality.

- a) A rain gauge shall be maintained in good working order on the site unless another rain-monitoring device has been approved by the Division of Water Quality.
- b) A written record of the daily rainfall amounts shall be retained and all records shall be made available to Division of Water Quality or authorized agent upon request. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, the cumulative rain measurement for those un-attended days will determine if a site inspection is needed. (Note: if no rainfall occurred, the permittee must record "zero").
- c) Erosion and sedimentation control measures shall be inspected to ensure that they are operating correctly. Inspection records must be maintained for each inspection event and for each measure. At a minimum, inspection of measures must occur at the frequency indicated below:
 - i) All erosion and sedimentation control measures must be inspected by or under the direction of the permittee at least once every seven calendar days, and
 - ii) All erosion and sediment control measures must be inspected by or under the direction of the permittee within 24 hours after any storm event of greater than 0.50 inches of rain per 24 hour period.
- d) Once land disturbance has begun on the site, stormwater runoff discharge outfalls shall be inspected by observation for erosion, sedimentation and other stormwater discharge characteristics such as clarity, floating solids, and oil sheens. Inspections of the outfalls shall be made at least once every seven calendar days and within 24 hours after any storm event of greater than 0.50 inches of rain per 24 hour period.

- e) Inspections are only required to be made during normal business hours. When adverse weather conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection can be delayed until it is deemed safe to perform these duties. (Times when inspections were delayed because of safety issues should be noted in the Inspection Record.) If the inspection cannot be done on that day, it must be completed on the following business day.
- f) Twenty-four Hour Reporting for visible sediment deposition
 - i) The permittee shall report to the Division of Water Quality central office or the appropriate regional office any visible sediment being deposited in any stream or wetland or any noncompliance which may endanger health or the environment. (See Section VIII of this permit for contact information.) Any information shall be provided orally or electronically within 24 hours from the time the permittee became aware of the circumstances.
 - ii) A written submission shall be provided to the appropriate regional office of the Division of Water Quality within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the sediment deposition and actions taken to address the cause of the deposition. The Division of Water Quality staff may waive the requirement for a written report on a case-by-case basis.
- g) Records of inspections made during the previous 30 days shall remain on the site and available for agency inspectors at all times during normal working hours, unless the Division of Water Quality provides a site-specific exemption based on unique site conditions that make this requirement not practical. Older records must be maintained for a period of three years after project completion and made available upon request. The records must provide the details of each inspection including observations, and actions taken in accordance with this permit. The permittee shall record the required rainfall and monitoring observations on the Inspection Record form provided by the Division or a similar inspection form that is inclusive of all of the elements contained in the Division's form. Use of electronically-available records, in lieu of the required paper copies for inspection will be allowed if shown to provide equal access and utility as the hard-copy records.
- h) Inspection records must include, at a minimum, the following:
 - i) Control Measure Inspections: Inspection records must include at a minimum: 1) identification of the measures inspected, 2) date and time of the inspection, 3) name of the person performing the inspection, 4) indication of whether the measures were operating properly, 5) description of maintenance needs for the measure, 6) corrective actions taken (7) date of actions taken, as well as the date and amounts of rainfall received.
 - ii) Stormwater Discharge Inspections: Inspection records must include at a minimum: 1) identification of the discharge outfall inspected, 2) date and time of the inspection, 3) name of the person performing the inspection, 4) evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5) indication of visible sediment leaving the site, 6) actions taken to correct/prevent sedimentation and 7) date of actions taken.
 - iii) Visible Sedimentation Found Outside the Site Limits: Inspection records must include: 1) an explanation as to the actions taken to control future releases, 2) actions taken to clean up or stabilize the sediment that has left the site limits and 3) the date of actions taken.
 - iv) Visible Sedimentation Found in Streams or Wetlands: All inspections should include evaluation of streams or wetlands onsite or offsite (where accessible) to determine if visible sedimentation has occurred.
- i) Visible Stream Turbidity - If the discharge from a site results in an increase in visible stream turbidity, inspection records must record that evidence and actions taken to reduce sediment contributions. Sites discharging to streams named on the state's 303(d) list as impaired for sediment-related causes may be required to perform additional monitoring, inspections or

application of more-stringent management practices if it is determined that the additional requirements are needed to assure compliance with the federal or state impaired-waters conditions. If a discharge covered by this permit enters a stream segment that is listed on the Impaired Stream List for sediment-related causes, and a Total Maximum Daily Load (TMDL) has been prepared for those pollutants, the permittee must implement measures to ensure that the discharge of pollutants from the site is consistent with the assumptions and meets the requirements of the approved TMDL. The Division of Water Quality 303(d) list can be found at: http://h2o.enr.state.nc.us/tmdl/General_303d.htm/

4.) Sediment Basins

Sediment basins and traps shall meet the following requirements:

- a) Outlet structures shall be utilized that withdraw water from the surface.
- b) For basins or traps that have a drainage area of less than 1.0 acre, draw-down designs specified in the Division of Land Resources or delegated local program requirements are acceptable.
- c) Chemical treatment
 - i) All treatment chemicals must be stored in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures designed to protect adjacent surface waters.
 - ii) All treatment chemicals must be used in accordance with dosing specifications and application rates provided by the manufacturer, supplier and as specified by the Division of Water Quality.
 - iii) The Permittee must only use chemicals that have been approved by the NC Division of Water Quality and posted on their "North Carolina Division of Water Quality Approved PAMS/Flocculants List" found on their web site at: <http://portal.ncdenr.org/web/wq/ws/su>.
 - iv) The Permittee must route stormwater treated with polymers, flocculants, or other treatment chemicals through sediment trapping, filtering, and/or settling devices(s) to ensure adequate removal of sediment flocculent prior to discharge to surface waters.
- d) Discharge requirement - Discharges must meet the statutory requirements of the Sediment Pollution Control Act and utilize the provisions of Section 6.74 of the Erosion and Sediment Control Planning and Design Manual to assure that buffers and vegetated areas will be used to reduce the potential for visible siltation outside of the 25% buffer zone nearest the land-disturbing activity.

5.) Discharges to Special or Threatened Waters

- a) Disturbed areas within one mile of and draining to waters where federally-listed threatened or endangered aquatic species are present shall be limited at any time to a maximum total area within the boundaries of the tract of 20 acres. These projects shall also use control measures that are designed, installed and maintained in accordance with criteria set forth in 15A NCAC 04B .0124 – Design Standards in Sensitive Watersheds. The Division of Water Quality may require additional/alternative protection measures or require coverage under an individual Construction NPDES Stormwater permit. Other management practices may be acceptable if these designs are shown by the applicant, to the satisfaction of the Director, to provide equivalent protection.
- b) Construction activities in High Quality Waters Zones require quicker ground stabilization provisions as specified in Section II.B.2.b. of the permit.

SECTION III **FRAMEWORK OF PERMIT COVERAGE**

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge stormwater associated with construction activity including clearing, grading and excavation activities resulting in the disturbance of land and related support activities. Such discharges shall be controlled, limited and monitored as specified in this permit.

- 1) Continuation of Previously Permitted Projects - Projects and their corresponding activities permitted under the previous version of the NC general permit for construction activities will continue to be valid with the previous permit conditions and will be considered covered under this general permit.
- 2) Projects submitted prior to the effective date of the permit – Complete project applications that were received prior to the effective date of this permit, but not approved by the permitting authority until after approval of this NPDES permit, can rely on design and management practices effective at the time of application submittal.
- 3) Implementation of the Erosion and Sedimentation Control Plan (E&SC Plan):
 - a) The Permittee must implement and follow the E&SC Plan, which has been approved by the Division of Land Resources or local delegated program.. The approved E&SC Plan is considered a condition of this general permit.
 - b) Deviation from the approved E&SC Plan, or approved amendment, shall constitute a violation of the terms and conditions of this general permit except that deviation from the approved plan will be allowed:
 - i) to correct an emergency situation where sediments are being discharged off the site, or,
 - ii) when minor modifications have been made that result in an alteration or relocation of an erosion or sedimentation control measure and does not affect the ability of the measure to perform as intended.
 - c) Allowed deviations must be noted on the approved E&SC Plan and maintained at the job site.
 - d) Prior to the commencement of any land disturbance onsite, and during the construction activities, a copy of the approved E&SC Plan and this NPDES construction permit shall be maintained on the site. These documents must be kept current and up to date.
- 4) BMPs and Control Measures - Consistent with the provisions contained in this permit and the E&SC Plan, the permittee must select, install, implement and maintain best management practices (BMPs) and control measures that minimize pollutants in the discharge to meet the requirements of this permit.
- 5) Additional Action - If there is evidence indicating that the stormwater discharges from the site are impacting or have the potential to impact surface waters or wetlands, the Division of Water Quality may take appropriate actions including any or all of the following:
 - a) take compliance and enforcement action;
 - b) require the permittee to include and implement appropriate control and restoration measures;
 - c) require the permittee to develop and implement additional site-specific stormwater pollution prevention measures;
 - d) require the permittee to obtain an individual permit.
- 6) When an Individual Permit may be Required - The Director may require any owner/operator authorized to discharge under a certificate of coverage issued pursuant to this general permit to apply for and obtain an individual permit or a general permit with additional conditions. Any interested person may petition the Director to require an individual permit pursuant to 15A NCAC 2H .0127. Cases where an individual permit may be required include, but are not limited to, the following:
 - a) The receiving stream is of a unique quality and the standard conditions may not provide adequate protection;
 - b) The discharger is a significant contributor of pollutants;
 - c) Conditions at the permitted site change, altering the constituents and/or characteristics of the discharge such that the discharge no longer qualifies for a General Permit;

- d) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;
 - e) The discharge violates the terms or conditions of this general permit;
 - f) Effluent limitations are promulgated for the point sources covered by this general permit;
 - g) A Water Quality Management Plan containing requirements applicable to such point sources is approved after the issuance of this general permit.
- 7) When an Individual Permit may be Requested - Any permittee operating under this general permit may request to be excluded from the coverage of this general permit by applying for an individual permit. When an individual permit is issued to an owner/operator the applicability of this general permit is automatically terminated on the effective date of the individual permit.

SECTION IV

OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

- 1) Proper Operation and Maintenance - The permittee shall at all times properly operate and maintain all control measures and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this general permit.
- 2) Need to Halt or Reduce not a Defense - It shall not be a defense for a permittee in an enforcement action that it was necessary to halt or reduce the permitted activity in order to maintain compliance with the condition of this general permit.
- 3) Bypassing of Stormwater Control Facilities
 - a) Bypass Not Exceeding Limitations.
The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation or as part of a planned action specified in the approved Erosion and Sedimentation Control Permit. These bypasses are not subject to the provisions of Paragraphs b. and c. of this section.
 - b) Notice
 - i) Anticipated bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass; including an evaluation of the anticipated quality and effect of the bypass.
 - ii) Unanticipated bypass - The permittee shall submit notice to the Division contact (See Section VIII.) within 24 hours of the occurrence of an unanticipated bypass.
 - c) Prohibition of Bypass
Bypass is prohibited and the Director may take enforcement action against a permittee for bypass, unless:
 - i) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;
 - ii) There were no feasible alternatives to the bypass, such as the use of auxiliary control facilities, retention of stormwater or maintenance during normal periods of equipment downtime or dry weather. This condition is not satisfied if adequate backup controls should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
 - iii) The permittee submitted notices as required under Paragraph b. of this section.
 - d) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in Paragraph c. of this section.
- 4) Upsets
 - a) Definition - "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment or control facilities,

inadequate treatment or control facilities, lack of preventive maintenance, or careless or improper operation.

- b) Effect of an Upset - An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph c. of this condition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
 - c) Conditions Necessary for a Demonstration of Upset - A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - i) An upset occurred and that the permittee can identify the cause(s) of the upset;
 - ii) The permitted facility was at the time being properly operated;
 - iii) The permittee submitted notice of the upset as required in this general permit, and,
 - iv) The permittee complied with any remedial measures required in this general permit.
 - d) Burden of Proof - In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.
- 5) Inspection and Entry - The permittee shall allow the Director or an authorized representative (including an authorized contractor acting as a representative of the Director), upon the presentation of credentials and other documents as may be required by law, to:
- a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this general permit;
 - b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this general permit;
 - c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this general permit; and
 - d) Sample or monitor at reasonable times, for the purposes of assuring general permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION V PERMIT ADMINISTRATION AND COMPLIANCE ISSUES

- 1) Time of compliance – Erosion and sedimentation control measures shall be maintained, and self-monitoring shall continue, after the completion of construction and development until the establishment of permanent ground cover sufficient to restrain erosion or until the financially responsible party has conveyed ownership or control of the tract of land for which the erosion and sedimentation control plan has been approved and the agency that approved the plan has been notified. If the financially responsible party has conveyed ownership or control of the tract of land for which the Erosion and Sedimentation Control Plan has been approved, the new owner or person in control shall conduct and document self-monitoring until the establishment of permanent ground cover sufficient to restrain erosion.

Upon establishment of permanent ground cover sufficient to restrain erosion, the permittee shall request an inspection by the permitting authority to verify the adequacy of the ground cover. Coverage under the permit shall end when a Sedimentation Inspection Report is issued documenting the final stabilization of the site with adequate permanent ground cover. The signed Sedimentation Inspection Report shall serve as a notice of termination.

- 2) Operation efficiency - During construction and until the completion of construction or development and the establishment of permanent stabilization, the permittee shall provide the operation and maintenance necessary to operate the storm water control measures and all erosion and sedimentation control measures at optimum efficiency.
- 3) Corrective action - If inspections required by this permit identify a need for maintenance of control measures, modifications or additions to control measures, or corrective actions to control sediment

or other pollutants these actions must be performed as soon as possible and before the next storm event to maintain the effectiveness of the control measures.

- 4) Duty to Comply - The permittee must comply with all conditions of this general permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; certificate of coverage termination, revocation and reissuance, or modification; or denial of a certificate of coverage upon renewal application.
 - a) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
 - b) The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$27,000 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.
 - c) Under state law, a daily civil penalty of not more than twenty-five thousand dollars (\$25,000) per violation may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of a permit. [Ref: NC General Statute 143-215.6A].
 - d) Any person may be assessed an administrative penalty by the Administrator of the U.S. Environmental Protection Agency for violating section 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed \$16,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$37,500. Penalties for Class II violations are not to exceed \$16,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$177,500.
- 5) Duty to Mitigate - The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this general permit that has a reasonable likelihood of adversely affecting human health or the environment.

- 6) Civil and Criminal Liability - Except as provided in Section IV.3. of this permit regarding bypassing of stormwater control facilities, nothing in this general permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties for noncompliance pursuant to NCGS 143-215.3, 143-215.6A, 143-215.6B, 143-215.6C or Section 309 of the Federal Act, 33 USC 1319. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.
- 7) Oil and Hazardous Substance Liability - Nothing in this general permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under NCGS 143-215.75 et seq. or Section 311 of the Federal Act, 33 USC 1321. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.
- 8) Property Rights - The issuance of this general permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.
- 9) Severability - The provisions of this general permit are severable, and if any provision of this general permit, or the application of any provision of this general permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this general permit, shall not be affected thereby.
- 10) Duty to Provide Information - The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the certificate of coverage issued pursuant to this general permit or to determine compliance with this general permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this general permit.
- 11) Signatory Requirements
 - a) All applications, reports, or information submitted to the Director shall be signed and certified as follows:
 - i) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (a) 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, or (b) the manager of one or more manufacturing production or operating facilities provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
 - ii) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - iii) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.
 - b) All reports required by the general permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - i) The authorization is made in writing by a person described above;
 - ii) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, a position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the

company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

iii) The written authorization is submitted to the Director.

c) Any person signing a document under paragraphs a. or b. of this section shall make the following certification:

“I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.”

- 12) Penalties for Tampering - The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this general permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.
- 13) General Permit Modification, Revocation and Reissuance, or Termination - The issuance of this general permit does not prohibit the Director from reopening and modifying the general permit, revoking and reissuing the general permit, or terminating the general permit as allowed by the laws, rules, and regulations contained in Title 40, Code of Federal Regulations, Parts 122 and 123; Title 15A of the North Carolina Administrative Code, Subchapter 2H .0100; and North Carolina General Statute 143-215.1 et. seq.
- 14) Availability of Reports - Except for data determined to be confidential under NCGS 143-215.3(a)(2) or Section 308 of the Federal Act, 33 USC 1318, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the Division of Water Quality. As required by the Act, discharge data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in NCGS 143-215.6B or in Section 309 of the Federal Act.
- 15) Penalties for Falsification of Reports - The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this general permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both.
- 16) Anticipated Noncompliance - The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with the general permit requirements.
- 17) Other Information - Where the permittee becomes aware that it failed to submit any relevant facts in any report to the Director, it shall promptly submit such facts or information.
- 18) Limitations Reopener - This general permit shall be modified or alternatively, revoked and reissued, to comply with any applicable effluent guideline or water quality standard issued or approved under Sections 302(b) (2) (c), and (d), 304(b) (2) and 307(a) of the Clean Water Act, if the effluent guideline or water quality standard so issued or approved:
 - a) contains different conditions or is otherwise more stringent than any effluent limitation in the general permit; or
 - b) controls any pollutant not limited in the general permit.
 - c) The general permit as modified or reissued under this paragraph shall also contain any other requirements in the Act then applicable.

SECTION VI
DISCHARGE MONITORING AND TURBIDITY LIMITATIONS

This General Permit does not include requirements for numeric limits for discharges from construction sites. However, the next reissuance of this North Carolina Construction General Permit (NCG 01) is scheduled for five years from the date of approval of this permit and will contain effluent limitations as required in *Subpart B-Construction and Development Effluent Guidelines* of Part 450 of the Code of Federal Regulations.

SECTION VII
DEFINITIONS

- 1) Act or “the Act” or CWA - The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251, et. seq.
- 2) Best Management Practices (BMPs) - Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operation procedures, and management practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
- 3) Bypass - The intentional diversion of stormwater from any portion of a stormwater control facility.
- 4) Control Measures - Refers to any BMP or other structural or non-structural practices and procedures used to prevent or reduce the discharge of pollutants including practices to control erosion and sedimentation.
- 5) Director - The Director of the Division of Water Quality.
- 6) Division - The Division of Water Quality, Department of Environment, and Natural Resources.
- 7) EMC - The North Carolina Environmental Management Commission.
- 8) Erosion and Sedimentation Control Plan - A plan developed in compliance with the North Carolina Sedimentation Pollution Control Act of 1973 to prevent the erosion and deposition of sediment and other materials into the waters of the State from construction or other land-disturbing activities that disturb one or more acres of land. Each plan must be approved by the NC Sedimentation Control Commission or a program delegated by the Commission to a local government.
- 9) Ground cover - Any vegetative growth or other material which, when applied to the soil surface, renders the soil surface stable against accelerated erosion.
- 10) Normal Business Hours - These are generally considered to be between the hours of 6 a.m. and 6 p.m., or when workers are normally present on the construction site. Weekends and federal holidays are not considered normal business hours unless construction activities are taking place on the site during those times.
- 11) Permitting Authority - The permitting authority is the agency that issues the permit. The Division of Water Quality is the delegated NPDES permitting authority and issues this permit. However, some erosion and sedimentation control activities are performed by Division of Land Resources or the locally-delegated programs. Other activities may be shared by the two divisions and the local programs. The Land Quality Section of the Division of Land Resources and the Surface Water Protection Section of the Division of Water Quality maintain a Memorandum of Understanding that specifies specific roles of the two divisions and the local programs and will be used to assign specific control and oversight activities between the agencies.
- 12) Permanently Cease - When all or part of the land disturbing activity is complete and no additional alteration or disturbance of the land surface is planned prior to final stabilization.
- 13) Permanent Stabilization - When all soil disturbing activity is completed and exposed soils have been stabilized with a vegetative cover with a density of at least 80% or covered with a structural stabilization method. Permanent perennial vegetation may include the use of sod, shrubs and ground cover plants mixed with mulching, aggregate or other landscaping techniques. Structural methods include concrete, asphalt, retaining wall or other stabilization techniques.

- 14) Permittee -The person, firm or organizational entity that signed as the financially responsible party on the Erosion and Sedimentation Control Plan.
- 15) Point Source Discharge - Any discernible, confined and discrete conveyance, including but specifically not limited to, any pipe, ditch, channel, tunnel, conduit, discrete fissure, or container from which pollutants are or may be discharged to waters of the state.
- 16) Soil Stabilization - The use of vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.
- 17) Stormwater Pollution Prevention Plan (SWPPP) – The elements of the State’s stormwater pollution prevention program that provide the technology-based requirements designed to protect the state’s waters from the adverse impacts of sediments. In North Carolina, the combination of the NCG01 Construction General and the Erosion and Sedimentation Control Plan are considered the SWPPP. It should be noted that on sites that involve multiple or complex sources of pollution, the Division may require additional control measures as needed to assure that water quality is protected and these additional measures will also be considered part of the SWPPP.
- 18) Temporarily Cease - When all or part of the site that is and will remain un-worked for a period of days but where site land disturbing activity is not complete and additional land disturbing activity is planned.
- 19) Temporary Stabilization – When the establishment of ground cover over all disturbed areas (such as mulching, rolled erosion control products, vegetation, or other material) renders the surface stable against accelerated erosion. Stabilization shall be achieved with the establishment of a uniform and evenly-distributed (i.e., without large bare areas) ground cover with a cover density of at least 80%.
- 20) Severe property damage – Substantial physical damage to property, damage to the control measures that cause them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

SECTION VIII
N.C. DIVISION OF WATER QUALITY CONTACTS

Asheville Regional Office
2090 U.S. Highway 70
Swannanoa, NC 28778
828-296-4500
FAX 828-299-7043

Fayetteville Regional Office
Systel Building,
225 Green St., Suite 714
Fayetteville, NC 28301-5094
910-433-3300
FAX 910-486-0707

Mooresville Regional Office
610 East Center Ave.
Mooresville, NC 28115
704-663-1699
FAX 704-663-6040

Winston-Salem Regional Office
585 Waughtown Street
Winston-Salem, NC 27107
336-771-5000
FAX 336-771-4630

Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
252-946-6481
FAX 252-975-3716

Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, NC 28405
910-796-7215
FAX 910-350-2004

Raleigh Regional Office
3800 Barrett Drive
Raleigh, NC 27609
919-791-4200
FAX 919-571-4718

Raleigh Regional Office
Mail to:
1628 Mail Service Center
Raleigh, NC 27699-1628

INSPECTION AND MONITORING RECORDS FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCG010000 AND SELF-INSPECTION RECORDS FOR LAND DISTURBING ACTIVITIES PER G.S. 113A-54.1

Project Name			Land Quality or Local Program Project #	
Financially Responsible Party, (FRP) / Permittee			County	
INSPECTOR	Name		Employer	
Inspector Type (Mark)	X	Address		
FRP/Permittee		Phone Number		
Agent/Designee		Email Address		

PART 1A: Rainfall Data

Day / Date	Rain Amt (inches)	Daily Rainfall Required, except for Holidays or Weekends. If no rain, indicate with a "zero"
M		
T		
W		
Th		
F		
Sat (Optional)		
Sun (Optional)		

PART 1B: Current Phase of Project

Phase of Grading check the applicable box(es)	
Installation of perimeter erosion and sediment control measures	X
Clearing and grubbing of existing ground cover	
Completion of any phase of grading of slopes or fills	
Installation of storm drainage facilities	
Completion of all land-disturbing activity, construction or development	
Permanent ground cover sufficient to restrain erosion has been established	

PART 1C: Signature of Inspector

By this signature, I certify in accordance with the NCG010000 permit & G.S. 113A-54.1 that this report is accurate and complete to the best of my knowledge.	
Financially Responsible Party / Permittee or Agent / Designee	Date

GROUND STABILIZATION TIMEFRAMES

Site Area Description	Stabilization	Timeframe Exceptions
Perimeter dikes, swales and slopes	7 Days	None
High Quality Water (HQW) Zones	7 Days	None
Slopes Steeper than 3:1	7 Days	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
Slopes 3:1 or flatter	14 Days	7 days for slopes greater than 50' in length
All other areas with slopes flatter than 4:1	14 Days	None, except for perimeters and HQW Zones

*For an editable copy of this form as a Word doc and other information, see <http://portal.ncdenr.org/web/lr/erosion>

PART 2A: EROSION AND SEDIMENTATION CONTROL MEASURES: Measures must be inspected at least ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT GREATER THAN 0.5 INCH PER 24 HOUR PERIOD.

Erosion and Sedimentation Control Measures Inspected					Inspection Date	Describe Actions Needed <u>Corrective actions should be performed as soon as possible and before the next storm event</u>	Date Corrected
Measure ID or Location and Description	Operating Properly? (Y/N)	Any Repair or Maintenance Needed? (Y/N)	New Measures Installed*				
			Proposed Dimensions (ft.)	Actual Dimensions (ft.)	Significant Deviation from Plan? (Y/N)		

*New erosion and sedimentation control measures installed since the last inspection should be documented here or by initialing and dating each measure or practice shown on a copy of the approved erosion and sedimentation control plan. List Dimensions of Measures such as Sediment Basins and Riprap Aprons

PART 2B: STORMWATER DISCHARGE OUTFALLS (SDOs): SDOs must be inspected at least ONCE PER 7 CALENDAR DAYS AND WITHIN 24 HOURS OF A RAINFALL EVENT GREATER THAN 0.5 INCH PER 24 HOUR PERIOD.

Stormwater Discharge Outfalls Inspected				Inspection Date	Report Visible Sedimentation to streams or wetlands to Land Quality within 24 Hours http://portal.ncdenr.org/web/lr/division-contacts Describe Actions Needed <u>Corrective actions should be performed as soon as possible and before the next storm event</u>	Date Corrected
Stormwater Discharge Outfall ID or Location	Any Visible Sedimentation in Streams, Wetlands or Outside Site Limits? (Y/N)	Any Increase in Stream Turbidity from Discharge? (Y/N)	Any Visible Erosion below SDO? (Y/N)			

PART 2C: GROUND STABILIZATION Must be recorded after each Phase of Grading

Areas Where Land Disturbance Has Been Completed or Temporarily Stopped	Time Limit for Ground Cover 7 days or 14 days	Is Ground Cover Sufficient to Restrain Erosion? (Y/N)	Inspection Date	Describe Actions Needed	Date Corrected

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 Environment and Natural Resources 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).

WEST FORK TWELVE-MILE CREEK INTERCEPTOR, ANTIOCH CHURCH ROAD, MONROE, UNION COUNTY

Project Name and Location

UNION - 2018 - 106

AUGUST 9, 2018

Date of Plan Approval

w/ MODIFICATIONS



TAMERA EPLIN

ASSISTANT Regional Engineer

NCDOT Encroachment Contract



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

December 7, 2020

Cynthia Coto
500 N. Main St, Suite 400
Monroe, NC 28112

Subject: West Fork Twelve Mile Creek Interceptor

Encroachment Number: 18-105-U-Extension

Ms. Coto,

Your request for an extension to the subject encroachment agreement has been approved Pending approval to revisions made to the encroachment and plans.

If you have any questions about this matter, please contact Robert Weltner, Engineering Technician II, at (704) 218-5100 in Monroe.

Sincerely,

Robert Weltner

Robert Weltner
Engineer Technician II

CLA/ao
Cc: File



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 14, 2018

Cynthia Coto
500 N. Main St
Monroe, NC 28112

Subject: West Fork Twelve Mile Creek Interceptor

Encroachment Number: **18-105-U**

Dear Ms. Coto,

Enclosed are the executed copies of the subject encroachment contracts. These encroachments are approved subject to the attached provisions. Please read and have all subcontractors read these provisions.

If you have any questions about these special provisions, please contact Robert Weltner, Engineer Technician, at (704) 218-5100 in Monroe.

Sincerely,

Scott Cole ^{AMS}
Scott Cole, P.E.
Division Engineer

CLA
cc: District Field Copy
File

ROUTE SR 1338, SR 1346, PROJECT WEST FORK 12 - COUNTY OF STATE OF NORTH CAROLINA
SR 1358 INTERCEPTOR UNION

DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY ENCROACHMENT AGREEMENT

-AND-

PRIMARY AND SECONDARY HIGHWAYS

UNION COUNTY

500 N. MAIN STREET, MONROE, NC 28112

18 - 1057 U

THIS AGREEMENT, made and entered into this the 14 day of Aug 20 18 by and between the Department of Transportation, party of the first part; and Union County party of the second part,

WITNESSETH

THAT WHEREAS, the party of the second part desires to encroach on the right of way of the public road designated as Route(s) SR 1338, SR 1346, SR 1358, located Beginning approximately 900 LF east of the intersection of SR 1340 and HWY 84, following West Fork Twelve-Mile Creek for approximately 4,400 LF, crossing SR 1338 (Antioch Church Rd.) and continuing north along West Fork Twelve-Mile Creek for approximately 5,300 LF, crossing SR 1346 (Beulah Church Rd.) and continuing north along West Fork Twelve-Mile Creek for approximately 9,900 LF, crossing SR 1358 (Forest Lawn Dr.) and continuing north along West Fork Twelve-Mile Creek for approximately 4,400 LF and terminating at Brookhaven Pump Station.

with the construction and/or erection of: Approximately 24,000 LF of new buried sewer line, manholes, and three bores/tunnels under SR 1338, SR 1346, and SR 1358. Range of steel casing pipe diameters (48", 54", 60") and their respective wall thicknesses are indicated on the Hazen and Sawyer drawings entitled "West Fork Twelve-Mile Creek Interceptor."

WHEREAS, it is to the material advantage of the party of the second part to effect this encroachment, and the party of the first part in the exercise of authority conferred upon it by statute, is willing to permit the encroachment within the limits of the right of way as indicated, subject to the conditions of this agreement;

NOW, THEREFORE, IT IS AGREED that the party of the first part hereby grants to the party of the second part the right and privilege to make this encroachment as shown on attached plan sheet(s), specifications and special provisions which are made a part hereof upon the following conditions, to wit:

That the installation, operation, and maintenance of the above described facility will be accomplished in accordance with the party of the first part's latest POLICIES AND PROCEDURES FOR ACCOMMODATING UTILITIES ON HIGHWAY RIGHTS-OF-WAY, and such revisions and amendments thereto as may be in effect at the date of this agreement. Information as to these policies and procedures may be obtained from the Division Engineer or State Utility Agent of the party of the first part.

That the said party of the second part binds and obligates himself to install and maintain the encroaching facility in such safe and proper condition that it will not interfere with or endanger travel upon said highway, nor obstruct nor interfere with the proper maintenance thereof, to reimburse the party of the first part for the cost incurred for any repairs or maintenance to its roadways and structures necessary due to the installation and existence of the facilities of the party of the second part, and if at any time the party of the first part shall require the removal of or changes in the location of the said facilities, that the said party of the second part binds himself, his successors and assigns, to promptly remove or alter the said facilities, in order to conform to the said requirement, without any cost to the party of the first part.

That the party of the second part agrees to provide during construction and any subsequent maintenance proper signs, signal lights, flagmen and other warning devices for the protection of traffic in conformance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part.

That the party of the second part hereby agrees to indemnify and save harmless the party of the first part from all damages and claims for damage that may arise by reason of the installation and maintenance of this encroachment.

That the party of the second part agrees to restore all areas disturbed during installation and maintenance to the satisfaction of the Division Engineer of the party of the first part. The party of the second part agrees to exercise every reasonable precaution during construction and maintenance to prevent eroding of soil; silting or pollution of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces or other property; or pollution of the air. There shall be compliance with applicable rules and regulations of the North Carolina Division of Environmental Management, North Carolina Sedimentation Control Commission, and with ordinances and regulations of various counties, municipalities and other official agencies relating to pollution prevention and control. When any installation or maintenance operation disturbs the ground surface and existing ground cover, the party of the second part agrees to remove and replace the sod or otherwise reestablish the grass cover to meet the satisfaction of the Division Engineer of the party of the first part.

That the party of the second part agrees to assume the actual cost of any inspection of the work considered to be necessary by the Division Engineer of the party of the first part.

That the party of the second part agrees to have available at the construction site, at all times during construction, a copy of this agreement showing evidence of approval by the party of the first part. The party of the first part reserves the right to stop all work unless evidence of approval can be shown.

Provided the work contained in this agreement is being performed on a completed highway open to traffic; the party of the second part agrees to give written notice to the Division Engineer of the party of the first part when all work contained herein has been completed. Unless specifically requested by the party of the first part, written notice of completion of work on highway projects under construction will not be required.

That in the case of noncompliance with the terms of this agreement by the party of the second part, the party of the first part reserves the right to stop all work until the facility has been brought into compliance or removed from the right of way at no cost to the party of the first part.

That it is agreed by both parties that this agreement shall become void if actual construction of the work contemplated herein is not begun within one (1) year from the date of authorization by the party of the first part unless written waiver is secured by the party of the second part from the party of the first part.

During the performance of this contract, the second party, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor"), agrees as follows:

- a. **Compliance with Regulations:** The contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the U. S. Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
- b. **Nondiscrimination:** The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
- c. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- d. **Information and Reports:** The contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Department of Transportation or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the Department of Transportation, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.
- e. **Sanctions for Noncompliance:** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to,
 - (1) withholding of payments to the contractor under the contract until the contractor complies, and/or
 - (2) cancellation, termination or suspension of the contract, in whole or in part.
- f. **Incorporation of Provisions:** The contractor shall include the provisions of paragraphs "a" through "f" in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Department of Transportation to enter into such litigation to protect the interests of the State, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

R/W (161) Party of the Second Part certifies that this agreement is true and accurate copy of the form R/W (161) incorporating all revisions to date.

IN WITNESS WHEREOF, each of the parties to this agreement has caused the same to be executed the day and year first above written.

DEPARTMENT OF TRANSPORTATION

BY: Scott Osle AMO
DIVISION ENGINEER



Cynthia A. Coto

County Manager
Second Party

ATTEST OR WITNESS:



Lynn G. West

INSTRUCTIONS

When the applicant is a corporation or a municipality, this agreement must have the corporate seal and be attested by the corporation secretary or by the empowered city official, unless a waiver of corporate seal and attestation by the secretary or by the empowered City official is on file in the Raleigh office of the Manager of Right of Way. In the space provided in this agreement for execution, the name of the corporation or municipality shall be typed above the name, and title of all persons signing the agreement should be typed directly below their signature.

When the applicant is not a corporation, then his signature must be witnessed by one person. The address should be included in this agreement and the names of all persons signing the agreement should be typed directly below their signature.

This agreement must be accompanied, in the form of an attachment, by plans or drawings showing the following applicable information:

1. All roadways and ramps.
2. Right of way lines and where applicable, the control of access lines.
3. Location of the existing and/or proposed encroachment.
4. Length, size and type of encroachment.
5. Method of installation.
6. Dimensions showing the distance from the encroachment to edge of pavement, shoulders, etc.
7. Location by highway survey station number. If station number cannot be obtained, location should be shown by distance from some identifiable point, such as a bridge, road, intersection, etc. (To assist in preparation of the encroachment plan, the Department's roadway plans may be seen at the various Highway Division Offices, or at the Raleigh office.)
8. Drainage structures or bridges if affected by encroachment (show vertical and horizontal dimensions from encroachment to nearest part of structure).
9. Method of attachment to drainage structures or bridges.
10. Manhole design.
11. On underground utilities, the depth of bury under all traveled lanes, shoulders, ditches, sidewalks, etc.
12. Length, size and type of encasement where required.
13. On underground crossings, notation as to method of crossing - boring and jacking, open cut, etc.
14. Location of vents.

GENERAL REQUIREMENTS

1. Any attachment to a bridge or other drainage structure must be approved by the Head of Structure Design in Raleigh prior to submission of encroachment agreement to the Division Engineer.
2. All crossings should be as near as possible normal to the centerline of the highway.
3. Minimum vertical clearances of overhead wires and cables above all roadways must conform to clearances set out in the National Electric Safety Code.
4. Encasements shall extend from ditch line to ditch line in cut sections and 5' beyond toe of slopes in fill sections.
5. All vents should be extended to the right of way line or as otherwise required by the Department.
6. All pipe encasements as to material and strength shall meet the standards and specifications of the Department.

7. Any special provisions or specifications as to the performance of the work or the method of construction that may be required by the Department must be shown on a separate sheet attached to encroachment agreement provided that such information cannot be shown on plans or drawings.
8. The Department's Division Engineer should be given notice by the applicant prior to actual starting of installation included in this agreement.

Special Provisions

No Open Cut

18-105-U

Page 1 of 6

1. NCDOT WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

The North Carolina Department of Transportation is in the process of developing a Work Zone Traffic Control Qualification & Training program that will begin its implementation in 2009. This program will require qualified and trained Work Zone Flaggers in every flagging operation (July 2009), qualified and trained Work Zone Traffic Control Installers on every traffic control installation (January 2010) and qualified and trained Work Zone Traffic Control Supervisors on Significant Projects (July 2010). It is intended for the program to include anyone working within NCDOT Right of Way including work associated with NCDOT construction and encroachment agreements as well as all NCDOT operations.

Training for this certification will be provided by NCDOT approved training sources and/or private entities that have been pre-approved to train themselves. Additional information will be provided as this program progresses. If you have questions, contact our web site at www.ncdot.org/-wztc, or contact Meredith McDiarmid, P.E. with NCDOT Work Zone Traffic Control Unit at (919) 825-2619 or mmediarmid@ncdot.gov.

2. The encroaching party shall notify the District Engineer's office inspector Robert Weltner at telephone (704) 218-5100 or rcweltner@ncdot.gov 48 hours prior to beginning construction and after construction is complete, so a final inspection can be made. Please reference the encroachment number when notifying NCDOT.
3. The encroachment applicant shall have one (1) year from the approval date to start work. If work is not started within this one (1) year time period, the encroachment contract will become void, thus requiring written authorization from the District Engineer's office to proceed with construction.
4. The Manager of Right-of-Way, Division Engineer or a Representative thereof, reserves the right to stop work for non-compliance with the terms of this contract.
5. An executed copy of this encroachment agreement shall be present at the construction site at all times during construction. 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.
6. 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.
7. The encroaching party is required to contact the appropriate Utility Companies involved and make satisfactory arrangements to adjust the utilities in conflict with the proposed work prior to beginning construction.
8. Excavation within 500' of a signalized intersection will require notification by the party of the second part to Traffic Services at telephone number (704) 983-1998. All traffic signal or detection cables must be located prior to excavation.
9. 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.
10. It is the responsibility of the encroaching party to secure any needed environmental permits and/or authorizations prior to beginning construction. Permit authorizations from the US Army Corps of Engineers Asheville Regulatory Field Office, (828) 271-7980, and the NC Division of Water Quality Mooresville Regional Office, (704) 663-1699, are required for any stream or wetland impacts. If you, or your representative, determine that no permits or authorizations are needed, attach a letter of verification to the encroachment application stating such.

Special Provisions

No Open Cut

18-105-U

Page 2 of 6

11. It should be noted that there are federally protected plant species found within the Department of Transportation rights of way. While the department makes every effort to assure that these roadside populations are identified by posting "Do Not Mow" signs, it is the responsibility of the encroaching party to assure that these populations remained undisturbed. Assistance with threatened and endangered species issues can be obtained through the US Fish and Wildlife Service Asheville Field Office (828) 258-3939.
12. The encroaching party or the highway contractor shall not place or erect any advertising sign, price list, flag, or other identifying marker for the purpose of attracting attention to the site, either fixed or movable, on or extending over any portion on the highway right of way.
13. The contractor shall not begin the construction until after the traffic control and erosion control devices have been installed to the satisfaction of the District Engineer.
14. All personnel working within the right of way shall wear safety vests at all times.
15. Trenching, bore pits and/or other excavations shall not be left open or unsafe overnight. The Contractor shall comply with all OSHA requirements and provide a competent person on site to supervise excavation at all times.
16. The disturbed area shall be left in a safe, neat, and satisfactory condition daily.
17. All fill areas/backfill shall be compacted to 95% density in accordance with AASHTO T99 as modified by the NCDOT. 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.
18. Complete restoration including fertilizing, seeding, and mulching shall be established on all disturbed areas in accordance with the recommendations of the Division Roadside Environmental Engineer within a maximum of twenty-one (21) days of the initial disturbing activity.
19. All Seeding and Mulching Shall be in accordance with Section 1660 of the NCDOT Standard Specifications for Roads and Structures, 2018
20. All Erosion Control Devices shall be installed in accordance with **DIVISION 16 – EROSION CONTROL AND ROADSIDE DEVELOPMENT** of the N.C. Standard Specifications for Roads and Structures, 2018
21. Proper temporary and permanent measures shall be used to control erosion and sedimentation in accordance with all local, State and Federal regulations.
22. All materials and workmanship shall conform to the N. C. Department of Transportation's Standards and Specifications Manuals.
23. Strict compliance with the Policies and Procedures for Accommodating Utilities on Highway Rights of Way manual shall be required.
24. The resetting of the Control of Access fence shall be in accordance with the applicable NCDOT standard and as directed by the District Engineer.
25. Any utility placed on existing unpaved roads are subject to be relocated due to paving operations by the state. The encroaching party shall be responsible for the relocation if required.

Special Provisions

No Open Cut

18-105-U

Page 3 of 6

26. Any utility placed on state right of way is subject to being relocated due to roadway improvements. The encroaching party shall be responsible for the relocation if required.
27. The utility shall be buried around bridges and around or under all pipe culverts, it shall be located a minimum of 10' from the nearest part of the pipe culvert and bridge and at a minimum depth of 2' below the stream bed.
28. The encroaching party shall obtain proper approval from all affected pole owners prior to attachment of equipment to any pole. Failure to do so is a violation of the encroachment agreement. Approval can be rescinded and the facilities removed at the encroacher's expense.
29. Any drainage structure disturbed or damaged shall be restored to its original condition as directed by the District Engineer.
30. Any disturbed guardrail shall be reset according to the applicable standard or as directed by the District Engineer.
31. All driveways and sidewalks altered during construction shall be returned to a state comparable with the condition of the driveways or sidewalk prior to construction.
32. Concrete placement shall be within the guidelines of section 846-852 and 1000 of the NCDOT Standard Specifications for roads and structures, 2018.
33. **All Concrete Sidewalks and Curb Ramps Shall be ADA compliant.**
34. Right of Way monuments disturbed during construction shall be referenced by a registered Land Surveyor and reset after construction.
35. The party of the second part agrees to provide traffic control devices, lane closures, road closures, positive protection and/or any other warning or positive protection devices necessary for the safety of road users during construction and subsequent maintenance. This shall be performed in conformance with the latest NCDOT Roadway Standard Drawings and Standard Specifications for Roads and Structures and amendments or supplements thereto. When there is no guidance provided in the NCDOT Roadway Standard Drawings and Standard Specifications for Roads and Structures, comply with the Manual on Uniform Traffic Control Devices for Streets and Highways and amendments or supplements thereto. Information as to the above rules and regulations may be obtained from the NCDOT Division Engineer.
36. Ingress and egress shall be maintained to all businesses and dwellings affected by the project. Special attention shall be paid to police and fire stations, fire hydrants and hospitals.
37. **Any work requiring equipment or personnel within 5' of the edge of any travel lane of an undivided facility and within 10' of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers.**
38. Work shall not be performed on both sides of the road simultaneously within the same area.
39. No access, parking or material storage shall be allowed along or from Control of Access highways. No parking or material storage shall be allowed along the shoulders of any state- maintained roadway.
40. During non-working hours, equipment shall be 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.
41. All roadway signs that are removed due to construction shall be reinstalled as soon as possible. Damaged signs shall be replaced at the expense of the encroaching party.

Special Provisions
No Open Cut
18-105-U
Page 4 of 6

42. Excavation material shall not be placed on the pavement. Drainage structures shall not be blocked with excavation materials.
43. The utility shall be installed outside of the theoretical 1:1 slope from the edge of pavement to the bottom of the nearest excavation wall; otherwise, **Special Provision number 42 applies.**
44. All excavations inside the theoretical 1:1 slope from the existing edge of pavement to the bottom of the nearest trench wall shall be made in accordance with the following conditions:
- a. Active 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 an engineer registered in North Carolina. Shoring plans and design calculations shall be submitted to the Division Engineer for review prior to construction. Trench boxes shall not be accepted as shoring.
 - b. The trench backfill material shall meet the Statewide Borrow Criteria. The trench shall be backfilled in accordance with Section 300-7 of the 2018 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 ASSHTO T99 as modified by DOT.
 - c. A qualified NCDOT inspector should be on the site at all times during construction. The encroaching party should be required to reimburse NCDOT for the cost of providing the inspector. If NCDOT cannot supply an inspector, the encroaching party (not the utility contractor) should make arrangements to have a qualified inspector, under the supervision of a Professional Engineer registered in North Carolina, on the site at all times. The Registered Engineer should be required to certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.
 - d. 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.
45. All temporary and final pavement markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted to the Division Traffic Engineer at telephone (704) 982-4400 for review and approval.
- 46. Open Cutting of Pavement will not be allowed.**
47. A qualified department of transportation inspector shall be on the site as needed during construction.
48. All manholes, splice boxes and other appurtenances within NCDOT right of way shall be located at the right of way line. Manholes, splice boxes and/or vaults shall not be placed in the ditch line, side slopes of the ditches or in the pavement.
49. All manholes, splice boxes and/or vaults within NCDOT right of way shall be of a pre-approved design. If any proposed structure is not of a design pre-approved by NCDOT, the encroaching party shall submit details calculations signed and sealed by a Professional Engineer for approval prior to construction. Please contact Project Services to obtain the approved list.

Special Provisions

No Open Cut

18-105-U

Page 5 of 6

50. Directional drilling methods have not been given statewide approval for use on NCDOT right of way. Under no condition shall jetting alone or wet boring with water of utility pipelines be allowed. Directional boring using jetting with a Bentonite (or equivalent material) slurry is approved at a minimum depth of ten (10) feet below the pavement surface [fifteen (15') feet below the surface of partial and/or full control of access roads] and five (5') feet below any ditch line. Directional boring is not allowed in embankment material. Directional boring is

allowed **beneath** embankment material in naturally occurring soil. 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. All directional bores shall maintain ten (10) feet minimum (clear) horizontal distance from the nearest part of any structure, including but not limited to bridges, footings, pipe culverts or box culverts. All directional bores shall maintain ten (10) feet minimum (clear) vertical distance from the nearest

part of pipe culverts or box culverts. Directional bores are not allowed beneath bridge footings, culvert wingwall footings or retaining walls. The tip of the drill string shall have a cutter head. Detection wire shall be installed with non-ferrous material. Any changes shall be submitted to the District Engineer for approval prior

to construction. For multiple conduit installations (including perpendicular & parallel installations), install conduits with five (5) feet minimum horizontal separation between each conduit or install multiple conduits within a single duct. **An overbore shall not be more than two (2") inches greater than the diameter of the pipe or encasement. An overbore exceeding two (2") inches greater than the diameter of the pipe or encasement will be considered if the encroachment agreement includes a statement signed and sealed by a North Carolina Registered Professional Engineer indicating that an overbore in excess of two (2") inches of the diameter of the pipe or encasement will arch and no damage will be done to the pavement or sub-grade. 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.**

51. Encasement shall extend from ditch line to ditch line in cut sections, 5' beyond the toe of slope in fill sections, and 3' behind curb and gutter in curb and gutter sections.
52. Detection tape shall be buried in the trench approximately 1 foot above the fiber optic cable. 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.
53. Do not place valves, meter boxes or any such appurtenances in the ditch line.
54. Regulator stations, metering stations, cathodic test stations and anode beds are not permitted within the NCDOT right of way; however, header wires are permitted.
55. Provide a means of collecting and containing drilling fluid/slurry that returns to the surface such as a slurry pit. Provide measures to prevent drilling fluids from entering drainage ditches and storm sewer systems. Prevent drilling fluid/slurry from accumulating on or flowing onto pedestrian walkways, driveways and streets. Immediately remove all drilling fluids/slurry that are accidentally spilled.
56. Transport waste drilling fluid/slurry from site and dispose of in a method that complies with Federal, State and local laws and regulations.
57. Maintain pedestrian access at all times. When existing pedestrian facilities are disrupted, closed or relocated, provide temporary facilities that are detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Do not sever or move pedestrian facilities for non-construction activities such as parking for vehicles and equipment.

Special Provisions
No Open Cut
18-105-U
Page 6 of 6

58. All lanes of traffic are to be open during the hours of 6:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M., or as specified by the District Engineer. Two-way traffic on one 12-foot lane shall be maintained at all times.

In addition, the Contractor shall not close or narrow a lane of traffic, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

1. For **unexpected occurrence** that creates unusually high traffic volumes, as directed by the Engineer.
2. For **New Year's Day**, between the hours of **6:00 A.M.** December 31st and **9:00 A.M.** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **9:00 A.M.** the following Tuesday.
3. For **Easter**, between the hours of **6:00 A.M.** Thursday and **9:00 A.M.** Monday.
4. For **Memorial Day**, between the hours of **6:00 A.M.** Friday and **9:00 A.M.** Tuesday.
5. For **Independence Day**, between the hours of **6:00 A.M.** the day before Independence Day and **9:00 A.M.** the day after Independence Day.

If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **6:00 A.M.** the Thursday before Independence Day and **9:00 A.M.** the Tuesday after Independence Day.
6. For **Labor Day**, between the hours of **6:00 A.M.** Friday and **9:00 A.M.** Tuesday.
7. For **Veteran's Day**, between the hours of **6:00 A.M.** Thursday through **9:00 A.M.** Monday.
8. For **Thanksgiving Day**, between the hours of **6:00 A.M.** Tuesday and **9:00 A.M.** Monday.
9. For **Christmas**, between the hours of **6:00 A.M.** the Friday before the week of Christmas Day and **9:00 A.M.** the following Tuesday after the week of Christmas Day.

Holidays and holiday weekends shall include New Year's, Easter, Memorial Day, Independence Day, Labor Day, Thanksgiving, Veteran's Day and Christmas. The Contractor shall schedule his work so that lane closures will not be required during these periods, unless otherwise directed by the Engineer.

NCDOT Driveway Permit



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 2, 2018

Union County Public Works
John Shutak
500 N. Main St Suite 600
Monroe, NC 28112

SUBJECT: Temporary Construction Access Permit— six access points –3 onto Antioch Church Rd (SR 1338), 2 onto Forest Lawn Drive (SR 1358) and 1 onto Beulah Church Rd (SR 1346). These accesses serve the proposed West Fork Twelve-Mile Creek Interceptor in Town of Weddington, Union County.

PERMIT NUMBER: 18-029-U ~ 18-034-U -Temporary

Dear Sirs:

The appropriate staff members of the Division of Highways have completed a review of the subject permit application. **The driveway permit is approved subject to the attached provisions. The person to whom this letter is addressed is responsible for ensuring the contractor installing the access receives a copy of this information.** The contractor installing the access shall be responsible for following the approved access permit provisions as well as all notes shown on the site plan and for providing a copy of the permit on the site at all times.

This Access is only approved for a temporary access and shall be removed within one (1) year of the approval date of this permit.

Adequate sight distances should be reserved at all proposed entrances. Attached is a copy of the approved driveway access permit application.

If you have any questions, please contact me at the number below.

Sincerely yours,

Lee Ainsworth, P.E.
District 3 Engineer

CLA/SB
Attachments

cc: Lisa Thompson, Town of Weddington
File

ACCESS PERMIT PROVISIONS

ALL SUBCONTRACTORS DOING WORK WITHIN THE STATE RIGHT OF WAY ARE TO HAVE A COPY OF THESE PLANS AND SPECIAL PROVISIONS ON THE JOB SITE. NCDOT SHALL IMMEDIATELY SUSPEND ANY WORK WITHIN THE RIGHT-OF-WAY WHENEVER IT IS DETERMINED THAT THE CONTRACTOR DOES NOT HAVE A COPY OF THESE PROVISIONS AND THE PERMIT ON THE SITE.

- YOU MUST NOTIFY MAC OUTEN IN THE DISTRICT ENGINEER'S OFFICE AT (704) 218-5100 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION. MR. OUTEN IS TO BE NOTIFIED UPON COMPLETION SO AN INSPECTION CAN BE MADE.
- THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DOES NOT GUARANTEE THE RIGHT OF WAY** OF THE ROAD, NOR WILL IT BE RESPONSIBLE FOR ANY CLAIMS FOR DAMAGES BROUGHT BY ANY PROPERTY OWNER.
- ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO 2018 NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES AND ROADWAY STANDARD DRAWINGS.
- PROPER TRAFFIC CONTROL DEVICES, SIGNS, ETC. SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH SECTION 1101 OF THE 2018 NCDOT ROADWAY STANDARD DRAWINGS AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- ANY ROADWAY SIGNS THAT ARE REMOVED DURING CONSTRUCTION WILL BE REINSTALLED AS SOON AS POSSIBLE.
- TRAFFIC WILL BE MAINTAINED ON THE ROADWAY AT ALL TIMES.
- PROPER TEMPORARY AND PERMANENT MEASURES SHALL BE USED TO CONTROL EROSION AND SEDIMENTATION IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL AGENCIES. EROSION CONTROL DEVICES ARE TO BE MAINTAINED AS NEEDED BY THE DEVELOPER.
- ANY DRAINAGE STRUCTURES DISTURBED OR DAMAGED SHALL BE RESTORED TO ORIGINAL CONDITIONS AS DIRECTED BY THE DISTRICT ENGINEER OR HIS REPRESENTATIVE.
- COMPLETE RESTORATION INCLUDING FERTILIZING, SEEDING AND MULCHING OF ALL AREAS DISTURBED DURING CONSTRUCTION WILL FOLLOW WITHIN A MAXIMUM OF THIRTY (30) WORKING DAYS OF THE INITIAL DISTURBING ACTIVITY.
- POSITIVE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES.
- THE BACKFILL AROUND AND UNDER PIPES OR OTHER UTILITY INSTALLATIONS WITHIN CONSTRUCTION LIMITS SHALL BE MADE OF APPROVED MATERIAL AND COMPACTED TO AT LEAST 95% OF STANDARD DENSITY AS DETERMINED BY THE AASHTO METHOD T99.
- DIRT SHALL AT NO TIME BE PLACED ON ROADWAY PAVEMENT.
- NO TRENCHES, DROP-OFFS, EQUIPMENT, OR MATERIAL STOCKPILES ARE ALLOWED ON THE RIGHT OF WAY OVERNIGHT.
- ACCESS CONSTRUCTION MUST BE COMPLETED WITHIN (1) ONE YEAR AFTER THE APPROVAL DATE OF THIS PERMIT.

ACCESS PERMIT SPECIAL PROVISIONS

1. LANE CLOSURES ON ANTIOCH CHURCH RD (SR 1338), BEULAH CHURCH RD (SR 1346) AND FOREST LAWN DRIVE (SR 1358) SHALL BE BETWEEN THE HOURS OF 9:00 AM – 4:00 PM.

IN ADDITION, THE CONTRACTOR SHALL NOT CLOSE OR NARROW A LANE OF TRAFFIC, DETAIN AND/OR ALTER THE TRAFFIC FLOW ON OR DURING HOLIDAYS, HOLIDAY WEEKENDS, SPECIAL EVENTS, OR ANY OTHER TIME WHEN TRAFFIC IS UNUSUALLY HEAVY, INCLUDING THE FOLLOWING SCHEDULES:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

- FOR UNEXPECTED OCCURRENCE THAT CREATES UNUSUALLY HIGH TRAFFIC VOLUMES, AS DIRECTED BY THE ENGINEER.
 - FOR NEW YEAR'S DAY, BETWEEN THE HOURS OF 6:00 A.M. DECEMBER 31ST AND 9:00 A.M. JANUARY 2ND. IF NEW YEAR'S DAY IS ON A FRIDAY, SATURDAY, SUNDAY OR MONDAY, THEN UNTIL 9:00 A.M. THE FOLLOWING TUESDAY.
 - FOR EASTER, BETWEEN THE HOURS OF 6:00 A.M. THURSDAY AND 9:00 A.M. MONDAY.
 - FOR MEMORIAL DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY AND 9:00 A.M. TUESDAY.
 - FOR INDEPENDENCE DAY, BETWEEN THE HOURS OF 6:00 A.M. THE DAY BEFORE INDEPENDENCE DAY AND 9:00 A.M. THE DAY AFTER INDEPENDENCE DAY.
 - IF INDEPENDENCE DAY IS ON A FRIDAY, SATURDAY, SUNDAY OR MONDAY, THEN BETWEEN THE HOURS OF 6:00 A.M. THE THURSDAY BEFORE INDEPENDENCE DAY AND 9:00 A.M. THE TUESDAY AFTER INDEPENDENCE DAY.
 - FOR LABOR DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY AND 9:00 A.M. TUESDAY.
 - FOR VETERAN'S DAY, BETWEEN THE HOURS OF 6:00 A.M. THURSDAY THROUGH 9:00 A.M. MONDAY.
 - FOR THANKSGIVING DAY, BETWEEN THE HOURS OF 6:00 A.M. TUESDAY AND 9:00 A.M. MONDAY.
 - FOR CHRISTMAS, BETWEEN THE HOURS OF 6:00 A.M. THE FRIDAY BEFORE THE WEEK OF CHRISTMAS DAY AND 9:00 A.M. THE FOLLOWING TUESDAY AFTER THE WEEK OF CHRISTMAS DAY.
 - HOLIDAYS AND HOLIDAY WEEKENDS SHALL INCLUDE NEW YEAR'S, EASTER, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING, VETERAN'S DAY AND CHRISTMAS. THE CONTRACTOR SHALL SCHEDULE HIS WORK SO THAT LANE CLOSURES WILL NOT BE REQUIRED DURING THESE PERIODS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. THE PROPERTY OWNER OR LESSEE SHALL NOT PLACE OR ERECT ANY ADVERTISING SIGN, PRICE LIST, FLAG OR OTHER IDENTIFYING MARKER FOR THE PURPOSE OF ATTRACTING ATTENTION TO THE SITE, EITHER FIXED OR

PERMIT NUMBER: 18-029-U ~ 18-034-U -Temporary

MOVABLE, ON OR EXTENDING OVER ANY PORTION OF THE HIGHWAY RIGHT OF WAY.

3. BEFORE CLEARING AND GRADING OPERATIONS MAY BEGIN A CONSTRUCTION ENTRANCE WITH A MINIMUM DEPTH OF 6" OF 2-3" COARSE AGGREGATE SHALL BE INSTALLED FOR A MINIMUM OF 50' IN LENGTH AND 12' IN WIDTH AT THE ENTRANCE TO THE PROPOSED DRIVEWAY/ROADWAY CONNECTION.
4. CONTACT MR. TONY TAGLIAFERRI, DIVISION TRAFFIC ENGINEER, AT (704) 983-4400 IF ANY WORK IS TO BE DONE WITHIN 500 FEET OF ANY TRAFFIC SIGNALS WHERE LOOP DETECTORS MAY BE INVOLVED, **AT LEAST 48 HOURS PRIOR TO CONSTRUCTION**. ANY DAMAGE CAUSED TO ANY LOOP DETECTORS OR ANY OTHER SIGNAL RELATED EQUIPMENT WILL BE REPAIRED BY NCDOT AT THE EXPENSE OF THE ACCESS PERMIT APPLICANT.
5. THE ACCESS SHALL BE CONSTRUCTED AS SHOWN ON THE ATTACHED PLAN.
6. A MINIMUM OF 500 FEET OF SIGHT DISTANCE IS TO BE MAINTAINED AT ALL TIMES IN EACH DIRECTION.
7. AN APPROVED PLANTING PERMIT MUST BE OBTAINED FROM THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION BEFORE ANY PLANTING WILL BE PERMITTED WITHIN THE STATE RIGHT OF WAY. REQUESTS FOR PLANTING PERMITS SHOULD BE MADE TO MR. JEFFREY D'ARRUDA, ROADSIDE ENVIRONMENTAL ENGINEER; 716 WEST MAIN STREET; ALBEMARLE, NC 28001.
8. MAXIMUM CUT AND FILL SLOPES SHOULD NOT EXCEED 2:1 WITHIN STATE RIGHT OF WAY.

SIGNATURES OF APPLICANT

PROPERTY OWNER (APPLICANT)

COMPANY Union County Public Works
SIGNATURE [Signature]
ADDRESS 500 N. Main St. Suite 600
Monroe, NC 28112 Phone No. 704-296-4210

WITNESS

NAME Jodi Price
SIGNATURE [Signature]
ADDRESS _____

AUTHORIZED AGENT

COMPANY Union County Public Works
SIGNATURE [Signature]
ADDRESS 500 N. Main St. Suite 600
Monroe, NC 28112 Phone No. 704-296-4210

WITNESS

NAME Jodi Price
SIGNATURE [Signature]
ADDRESS _____

APPROVALS

APPLICATION RECEIVED BY DISTRICT ENGINEER

[Signature] 7/11/18
SIGNATURE DATE

APPLICATION APPROVED BY LOCAL GOVERNMENTAL AUTHORITY (when required)

[Signature] Administrator 7/18/18
SIGNATURE TITLE DATE

APPLICATION APPROVED BY NCDOT

[Signature] _____ 8/2/18
SIGNATURE TITLE DATE

INSPECTION BY NCDOT

SIGNATURE TITLE DATE

COMMENTS:

Temporary

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No. <u>18-030-U</u>	Date of Application <u>6/19/2018</u>	
County: <u>Union</u>		
Development Name: <u>West Fork Twelve-Mile Creek Interceptor</u>		

LOCATION OF PROPERTY:

Route/Road: Antoich Church Road (SR 1338)

Exact Distance 870 Miles Feet N S E W

From the Intersection of Route No. SR 1338 and Route No. High View Road Toward Mineral Springs

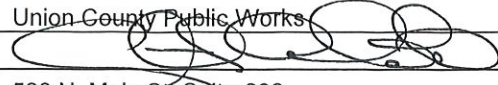
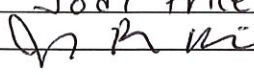
Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other

Property: is is not within Weddington, NC City Zoning Area.

AGREEMENT

- I, the undersigned property owner, request access and permission to construct driveway(s) or street(s) on public right-of-way at the above location.
- I agree to construct and maintain driveway(s) or street entrance(s) in absolute conformance with the current "Policy on Street and Driveway Access to North Carolina Highways" as adopted by the North Carolina Department of Transportation.
- I agree that no signs or objects will be placed on or over the public right-of-way other than those approved by NCDOT.
- I agree that the driveway(s) or street(s) will be constructed as shown on the attached plans.
- I agree that that driveway(s) or street(s) as used in this agreement include any approach tapers, storage lanes or speed change lanes as deemed necessary.
- I agree that if any future improvements to the roadway become necessary, the portion of driveway(s) or street(s) located on public right-of-way will be considered the property of the North Carolina Department of Transportation, and I will not be entitled to reimbursement or have any claim for present expenditures for driveway or street construction.
- I agree that this permit becomes void if construction of driveway(s) or street(s) is not completed within the time specified by the "Policy on Street and Driveway Access to North Carolina Highways".
- I agree to pay a \$50 construction inspection fee. Make checks payable to NCDOT. This fee will be reimbursed if application is denied.
- I agree to construct and maintain the driveway(s) or street(s) in a safe manner so as not to interfere with or endanger the public travel.
- I agree to provide during and following construction proper signs, signal lights, flaggers and other warning devices for the protection of traffic in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the District Engineer.
- I agree to indemnify and save harmless the North Carolina Department of Transportation from all damages and claims for damage that may arise by reason of this construction.
- I agree that the North Carolina Department of Transportation will assume no responsibility for any damages that may be caused to such facilities, within the highway right-of-way limits, in carrying out its construction.
- I agree to provide a Performance and Indemnity Bond in the amount specified by the Division of Highways for any construction proposed on the State Highway system.
- The granting of this permit is subject to the regulatory powers of the NC Department of Transportation as provided by law and as set forth in the N.C. Policy on Driveways and shall not be construed as a contract access point.
- I agree that the entire cost of constructing and maintaining an approved private street or driveway access connection and conditions of this permit will be borne by the property owner, the applicant, and their grantees, successors, and assignees.
- **I AGREE TO NOTIFY THE DISTRICT ENGINEER WHEN THE PROPOSED WORK BEGINS AND WHEN IT IS COMPLETED.**

SIGNATURES OF APPLICANT

	PROPERTY OWNER (APPLICANT)		WITNESS
COMPANY	Union County Public Works	NAME	Jodi Price
SIGNATURE		SIGNATURE	
ADDRESS	500 N. Main St. Suite 600	ADDRESS	
	Monroe, NC 28112 Phone No. 704-296-4210		

	AUTHORIZED AGENT		WITNESS
COMPANY	Union County Public Works	NAME	Jodi Price
SIGNATURE		SIGNATURE	
ADDRESS	500 N. Main St. Suite 600	ADDRESS	
	Monroe, NC 28112 Phone No. 704-296-4210		

APPROVALS

APPLICATION RECEIVED BY DISTRICT ENGINEER

		7/11/18
SIGNATURE		DATE

APPLICATION APPROVED BY LOCAL GOVERNMENTAL AUTHORITY (when required)

	Administrator	7/18/18
SIGNATURE	TITLE	DATE

APPLICATION APPROVED BY NCDOT

		8/2/18
SIGNATURE	TITLE	DATE

INSPECTION BY NCDOT

_____	_____	_____
SIGNATURE	TITLE	DATE

COMMENTS:

Temporary

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No. <u>18-031-U</u>	Date of Application <u>6/19/2018</u>	
County: <u>Union</u>		
Development Name: <u>West Fork Twelve-Mile Creek Interceptor</u>		

LOCATION OF PROPERTY:

Route/Road: Beulah Church Road (SR 1346)

Exact Distance 80 Miles Feet N S E W

From the Intersection of Route No. SR 1346 and Route No. Cobble Creek Drive Toward Wesley Chapel

Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other
Property: is is not within Weddington, NC City Zoning Area.

AGREEMENT

- I, the undersigned property owner, request access and permission to construct driveway(s) or street(s) on public right-of-way at the above location.
- I agree to construct and maintain driveway(s) or street entrance(s) in absolute conformance with the current "Policy on Street and Driveway Access to North Carolina Highways" as adopted by the North Carolina Department of Transportation.
- I agree that no signs or objects will be placed on or over the public right-of-way other than those approved by NCDOT.
- I agree that the driveway(s) or street(s) will be constructed as shown on the attached plans.
- I agree that that driveway(s) or street(s) as used in this agreement include any approach tapers, storage lanes or speed change lanes as deemed necessary.
- I agree that if any future improvements to the roadway become necessary, the portion of driveway(s) or street(s) located on public right-of-way will be considered the property of the North Carolina Department of Transportation, and I will not be entitled to reimbursement or have any claim for present expenditures for driveway or street construction.
- I agree that this permit becomes void if construction of driveway(s) or street(s) is not completed within the time specified by the "Policy on Street and Driveway Access to North Carolina Highways".
- I agree to pay a \$50 construction inspection fee. Make checks payable to NCDOT. This fee will be reimbursed if application is denied.
- I agree to construct and maintain the driveway(s) or street(s) in a safe manner so as not to interfere with or endanger the public travel.
- I agree to provide during and following construction proper signs, signal lights, flaggers and other warning devices for the protection of traffic in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the District Engineer.
- I agree to indemnify and save harmless the North Carolina Department of Transportation from all damages and claims for damage that may arise by reason of this construction.
- I agree that the North Carolina Department of Transportation will assume no responsibility for any damages that may be caused to such facilities, within the highway right-of-way limits, in carrying out its construction.
- I agree to provide a Performance and Indemnity Bond in the amount specified by the Division of Highways for any construction proposed on the State Highway system.
- The granting of this permit is subject to the regulatory powers of the NC Department of Transportation as provided by law and as set forth in the N.C. Policy on Driveways and shall not be construed as a contract access point.
- I agree that the entire cost of constructing and maintaining an approved private street or driveway access connection and conditions of this permit will be borne by the property owner, the applicant, and their grantees, successors, and assignees.
- **I AGREE TO NOTIFY THE DISTRICT ENGINEER WHEN THE PROPOSED WORK BEGINS AND WHEN IT IS COMPLETED.**

SIGNATURES OF APPLICANT

PROPERTY OWNER (APPLICANT)		WITNESS	
COMPANY	<u>Union County Public Works</u>	NAME	<u>Jodi Price</u>
SIGNATURE	<u></u>	SIGNATURE	<u></u>
ADDRESS	<u>500 N. Main St. Suite 600</u>	ADDRESS	<u></u>
	<u>Monroe, NC 28112</u> Phone No. <u>704-296-4210</u>		

AUTHORIZED AGENT		WITNESS	
COMPANY	<u>Union County Public Works</u>	NAME	<u>Jodi Price</u>
SIGNATURE	<u></u>	SIGNATURE	<u></u>
ADDRESS	<u>500 N. Main St. Suite 600</u>	ADDRESS	<u></u>
	<u>Monroe, NC 28112</u> Phone No. <u>704-296-4210</u>		

APPROVALS

APPLICATION RECEIVED BY DISTRICT ENGINEER

<u></u>	<u>7/11/18</u>
SIGNATURE	DATE

APPLICATION APPROVED BY LOCAL GOVERNMENTAL AUTHORITY (when required)

<u></u>	<u>Administrator</u>	<u>7/12/18</u>
SIGNATURE	TITLE	DATE

APPLICATION APPROVED BY NCDOT

<u></u>	<u></u>	<u>8/2/18</u>
SIGNATURE	TITLE	DATE

INSPECTION BY NCDOT

<u></u>	<u></u>	<u></u>
SIGNATURE	TITLE	DATE

COMMENTS:

Temporary

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No. <u>18-032-U</u>	Date of Application 6/19/2018	
County: Union		
Development Name: West Fork Twelve-Mile Creek Interceptor		

LOCATION OF PROPERTY:

Route/Road: Forest Lawn Drive (SR 1358)

Exact Distance 530 Miles Feet N S E W

From the Intersection of Route No. SR 1358 and Route No. Water Oak Lane Toward Monroe

Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other

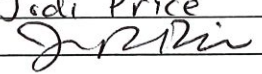
Property: is is not within Weddington, NC City Zoning Area.

AGREEMENT

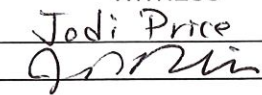
- I, the undersigned property owner, request access and permission to construct driveway(s) or street(s) on public right-of-way at the above location.
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- I agree that that driveway(s) or street(s) as used in this agreement include any approach tapers, storage lanes or speed change lanes as deemed necessary.
- I agree that if any future improvements to the roadway become necessary, the portion of driveway(s) or street(s) located on public right-of-way will be considered the property of the North Carolina Department of Transportation, and I will not be entitled to reimbursement or have any claim for present expenditures for driveway or street construction.
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- I agree to provide during and following construction proper signs, signal lights, flaggers and other warning devices for the protection of traffic in conformance with the current "Manual on Uniform Traffic Control Devices for Streets and Highways" and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the District Engineer.
- I agree to indemnify and save harmless the North Carolina Department of Transportation from all damages and claims for damage that may arise by reason of this construction.
- I agree that the North Carolina Department of Transportation will assume no responsibility for any damages that may be caused to such facilities, within the highway right-of-way limits, in carrying out its construction.
- I agree to provide a Performance and Indemnity Bond in the amount specified by the Division of Highways for any construction proposed on the State Highway system.
- The granting of this permit is subject to the regulatory powers of the NC Department of Transportation as provided by law and as set forth in the N.C. Policy on Driveways and shall not be construed as a contract access point.
- I agree that the entire cost of constructing and maintaining an approved private street or driveway access connection and conditions of this permit will be borne by the property owner, the applicant, and their grantees, successors, and assignees.
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SIGNATURES OF APPLICANT

PROPERTY OWNER (APPLICANT)
COMPANY Union County Public Works
SIGNATURE 
ADDRESS 500 N. Main St, Suite 600
Monroe, NC 28112 Phone No. 704-296-4210

WITNESS
NAME Jodi Price
SIGNATURE 
ADDRESS _____

AUTHORIZED AGENT
COMPANY Union County Public Works
SIGNATURE 
ADDRESS 500 N. Main St, Suite 600
Monroe, NC 28112 Phone No. 704-296-4210

WITNESS
NAME Jodi Price
SIGNATURE 
ADDRESS _____

APPROVALS

APPLICATION RECEIVED BY DISTRICT ENGINEER

 7/11/18
SIGNATURE DATE

APPLICATION APPROVED BY LOCAL GOVERNMENTAL AUTHORITY (when required)

 Administrator 7/10/18
SIGNATURE TITLE DATE

APPLICATION APPROVED BY NCDOT

 _____ 8/2/18
SIGNATURE TITLE DATE

INSPECTION BY NCDOT

SIGNATURE TITLE DATE

COMMENTS:

Temporary

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No. <u>18-033-U</u>	Date of Application <u>6/19/2018</u>	
County: <u>Union</u>		
Development Name: <u>West Fork Twelve-Mile Creek Interceptor</u>		

LOCATION OF PROPERTY:

Route/Road: Forest Lawn Drive (SR 1358)

Exact Distance 470 Miles N S E W
 Feet

From the Intersection of Route No. SR 1358 and Route No. Water Oak Lane Toward Monroe

Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other
Property: is is not within Weddington, NC City Zoning Area.

AGREEMENT

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Temporary

APPLICATION IDENTIFICATION		N.C. DEPARTMENT OF TRANSPORTATION STREET AND DRIVEWAY ACCESS PERMIT APPLICATION
Driveway Permit No. <u>18-034-U</u>	Date of Application <u>6/19/2018</u>	
County: <u>Union</u>		
Development Name: <u>West Fork Twelve-Mile Creek Interceptor</u>		

LOCATION OF PROPERTY:

Route/Road: Antioch Church Road (SR 1338)

Exact Distance 884 Miles Feet N S E W

From the Intersection of Route No. SR 1338 and Route No. High View Road Toward Mineral Springs

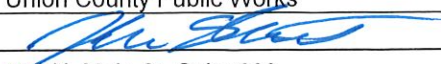
Property Will Be Used For: Residential /Subdivision Commercial Educational Facilities TND Emergency Services Other

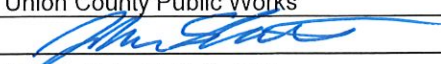
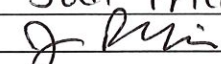
Property: is is not within Weddington, NC City Zoning Area.

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AUTHORIZED AGENT		WITNESS	
COMPANY	<u>Union County Public Works</u>	NAME	<u>Jodi Price</u>
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APPROVALS

APPLICATION RECEIVED BY DISTRICT ENGINEER

<u></u>	<u>7/11/18</u>
SIGNATURE	DATE

APPLICATION APPROVED BY LOCAL GOVERNMENTAL AUTHORITY (when required)

<u></u>	<u>Administrator</u>	<u>7/18/18</u>
SIGNATURE	TITLE	DATE

APPLICATION APPROVED BY NCDOT

<u></u>		<u>8/2/18</u>
SIGNATURE	TITLE	DATE

INSPECTION BY NCDOT

<u></u>	<u></u>	<u></u>
SIGNATURE	TITLE	DATE

COMMENTS:

NCDEQ 401 Water Quality Certification

Duke Energy Transmission Conditional Approval Letter



Duke Energy
3308 NC Highway 5
Aberdeen, NC 28315
910.944.5363
robert.james@duke-energy.com

May 24, 2018

Hazen and Sawyer
Attn: Mr. Jeff Greene – Senior Principle Designer
9101 Southern Pine Blvd., Ste. 250
Charlotte, NC 28273
704-941-6996

Re: REVISED - Duke Energy Transmission Line Right-of-Way Plan Review Conditional Approval
Project: Union County, NC West Fork Twelve-Mile Creek Interceptor– Duke Energy Easement
Line: Morning Star T – Oakboro TB Goose Creek (2M80) Str. 48-47 | Newport T – Morning Star TB Sandy Ridge (2N51) Str. 54-55 | 270' wide Duke Energy Transmission Easement
Morning Star - Monroe MN Indian Trail (1M1993) Str. 130-132.5 | 68' wide Duke Energy Transmission Easement

Dear Jeff,

This office has reviewed the proposed UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR site plans (attached separately via email) and referred to herein as Attachment "A". We find the plans as shown on the referenced drawings to be acceptable and in compliance with the attached transmission right-of-way guidelines and restrictions. Therefore Duke Energy Transmission ("DET") approves the referenced plans, insofar as its transmission easement rights are concerned, subject to the conditions detailed below. If this project construction has not commenced by a period of 12 months from the date of this letter, this approval by DET shall expire, and additional plan review will be required by DET at that time.

In summary, the following details DET's comments:

- No stockpiling or storage of materials, dirt, or equipment of any kind is permitted within the DET easement area, nor may any combustible materials be placed within the easement area.
- Contractors operating any and all equipment should be instructed not to operate within 25' of the poles, towers, or other electrical structures including guy anchors. All slopes shall be 4:1 or less. No spoil dirt is to be placed within the rights-of-way limits unless previously approved by DET.
- Any proposed easements must not cross closer than 25' to DET's electrical structures including, but not limited to poles, towers, and guy anchors.
- All underground facilities, such as, but not limited to, storm water pipes and domestic water line pipes, must be capable of a heavy equipment load bearing weight of 80,000 lbs. DET will not be responsible for damages to these installed facilities.
- Any damage to the transmission line or its associated structures, related to this project, and/or claims due to the damage, is the responsibility of the developer/owner.
- We have not reviewed, and therefore have not approved, any plans other than Attachment A. DET restrictions prohibit trees that exceed 15' at maturity or lights that exceed 15' within the rights-of-way limits, and neither may be within the wire zone. Vegetation that exceeds 15' in height is subject to removal by DET. Additionally, irrigation systems and signs are not permitted.
- This approval by DET is subject to the paramount right of DET at all times to make use of its entire easement area for the construction, maintenance, reconstruction, and operation of electric lines.

- This letter only addresses issues related to DET's transmission line easement. Additional easements, approvals, or permits from the underlying property owner(s) or other applicable agencies may be required in order for you to proceed with this project .

DET also offers these additional comments to ensure that other potential conflicts are not created during or after construction:

- If there are design changes to any drawings that involve the transmission right-of-way, DET requires a review of the changes for compliance with the rights-of-way guidelines.
- Proper clearances must be maintained at all times. If any transmission line modification by DET is required to maintain proper clearances, the cost will be the responsibility of the developer/owner. Any such line modifications must be approved and scheduled, through DET well in advance of the project start date.
- All current and future property owners are required to adhere to the most current version of the DET transmission right-of-way guidelines and restrictions. (attached separately via email)
- DET heavy equipment access must not be restricted during construction of this project due to grading or any other activity.
- Please contact me prior to the start of this project to attend any pre-construction meetings.

In not objecting to the use of the rights-of-way for use as shown on the drawings, DET is not relinquishing the right to control and maintain the rights-of-way as specified in the recorded easement documents. Any damages to the transmission lines or its associated structures, and claims caused by the damage, is the responsibility of the developer/contractor/owner. It is the responsibility of the developer/contractor/owner to ensure that all work performed in the proximity of the transmission lines complies with all applicable laws and regulations, including but not limited to the National Electric Safety Code ("**NESC**"), the Overhead High-Voltage Line Safety Act ("**OHVLSA**"), and the Occupational Safety and Health Act ("**OSHA**"), and that all persons working near the electric power lines are made aware of the inherent safety hazards associated with these lines.

Please note that this approval is based in part on the accuracy of the information you have supplied on the site plans (Attachment A). You are responsible for indicating the correct location of the DET right of way and its associated electrical structures along with the correct width of the DET rights-of-way limits.

Thank you for the opportunity to work with you on this project. If you have any questions, please feel free to contact me at 910-944-5363.

Sincerely,



Robbie James
Asset Protection Specialist
Transmission Right of Way

Attachments: Attachment "A" - Site Plans
Duke Energy Transmission Right-of-Way Guidelines & Restrictions
Duke Energy "Look Up & Live" Brochure

Cc: Caleb Crow (Duke Energy) Caleb.Crow@duke-energy.com
Martha Thompson (Duke Energy) Martha.Thompson@duke-energy.com

Attachment "A"

Referenced Site Plans:

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – GENERAL AND EROSION CONTROL NOTES AND SEQUENCE, JOB# 30831-049, SHEET X3, DATED MAY 2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – GENERAL ACCESS ROUTE 7, JOB# 30831-049, SHEET X4, DATED MAY 2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 80+00 TO STA 90+00, JOB# 30831-049, SHEET C9, DATED MAY 2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 90+00 TO STA 100+00, JOB# 30831-049, SHEET C10, DATED MAY 2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 120+00 TO STA 130+00, JOB# 30831-049, SHEET C13, DATED MAY 2018

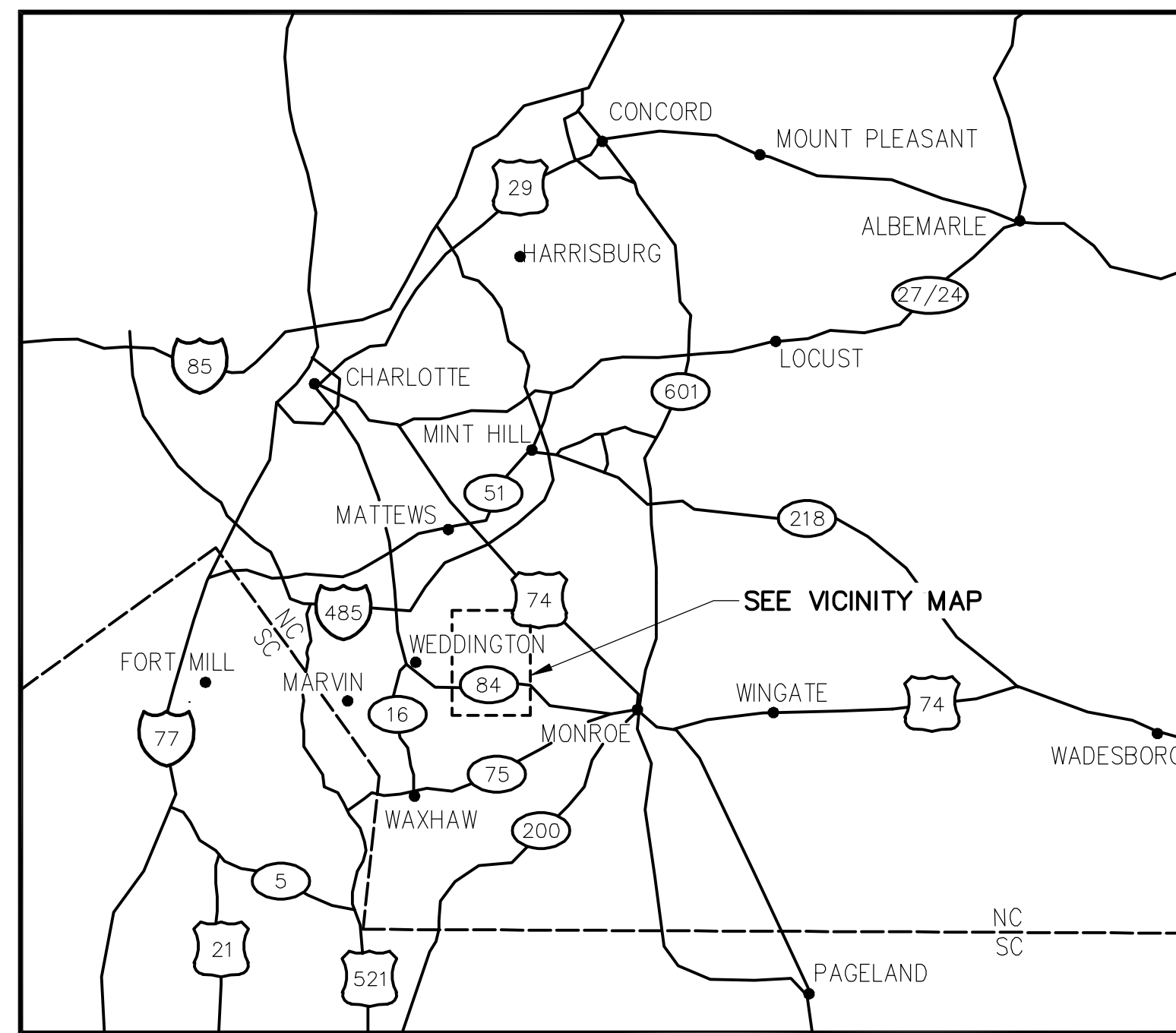
ADDITIONAL NOTES:

ORIGINAL NO OBJECTION APPROVAL PACKAGE WAS APPROVED & DATED FEBURARY 19, 2018. DUE TO REVISIONS SUBMITTED VIA HAZEN AND SAWYER – JEFF GREENE, A REVISED NO OBJECTION APPROVAL PACKAGE IS BEING SUBMITTED.

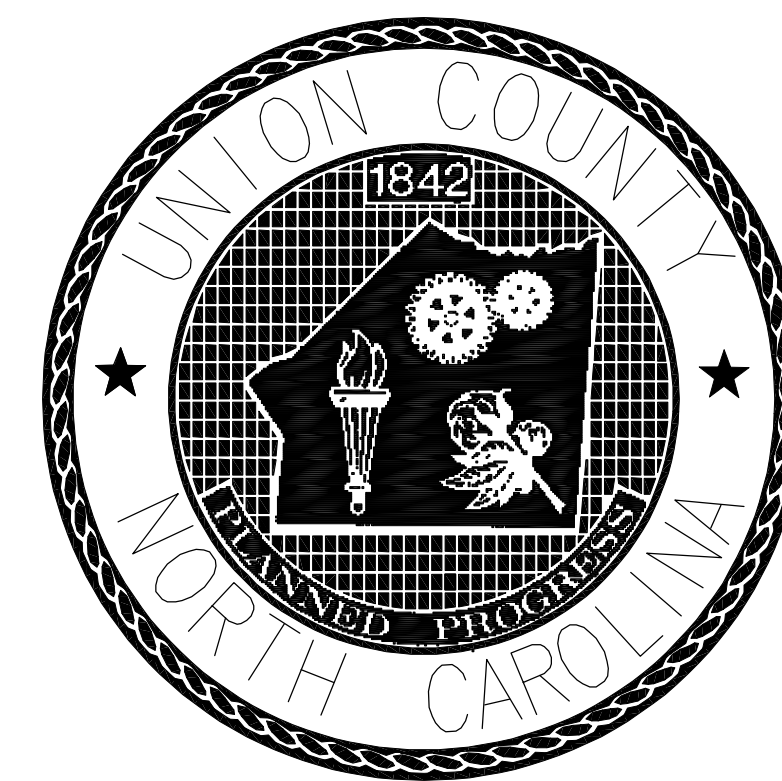
PUBLIC WORKS DEPARTMENT
UNION COUNTY, NORTH CAROLINA

WEST FORK TWELVE-MILE CREEK
INTERCEPTOR

UCPW PROJECT NO. SW037



LOCATION MAP
SCALE : N.T.S.

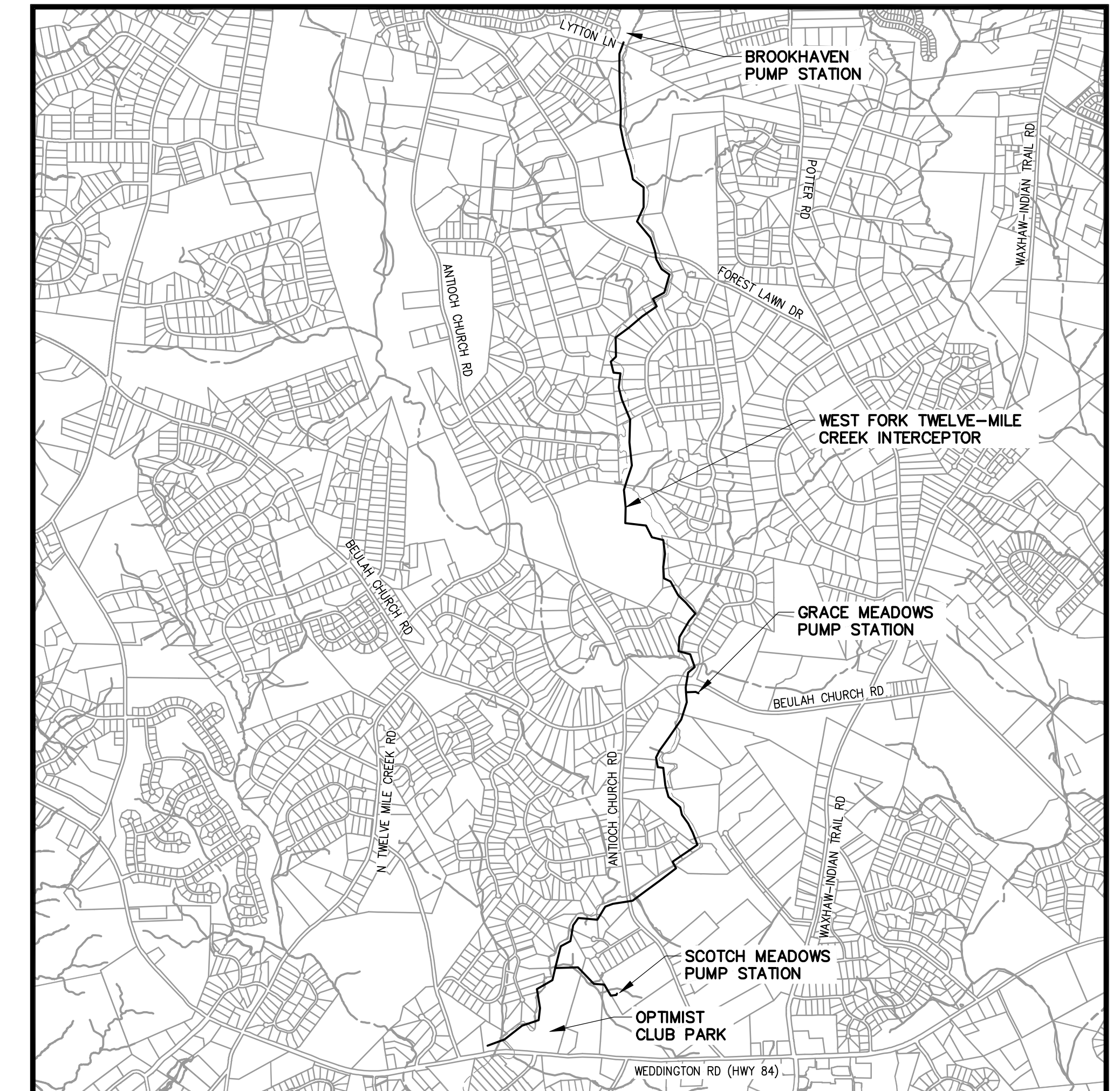


MAY 2018

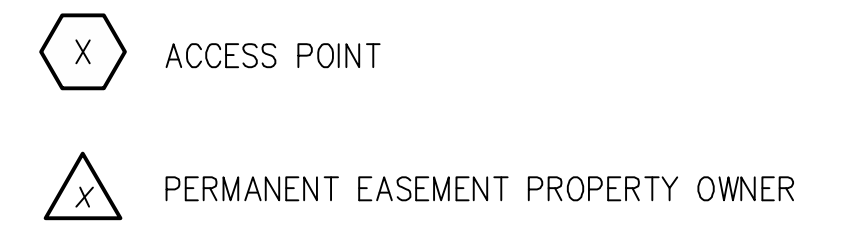
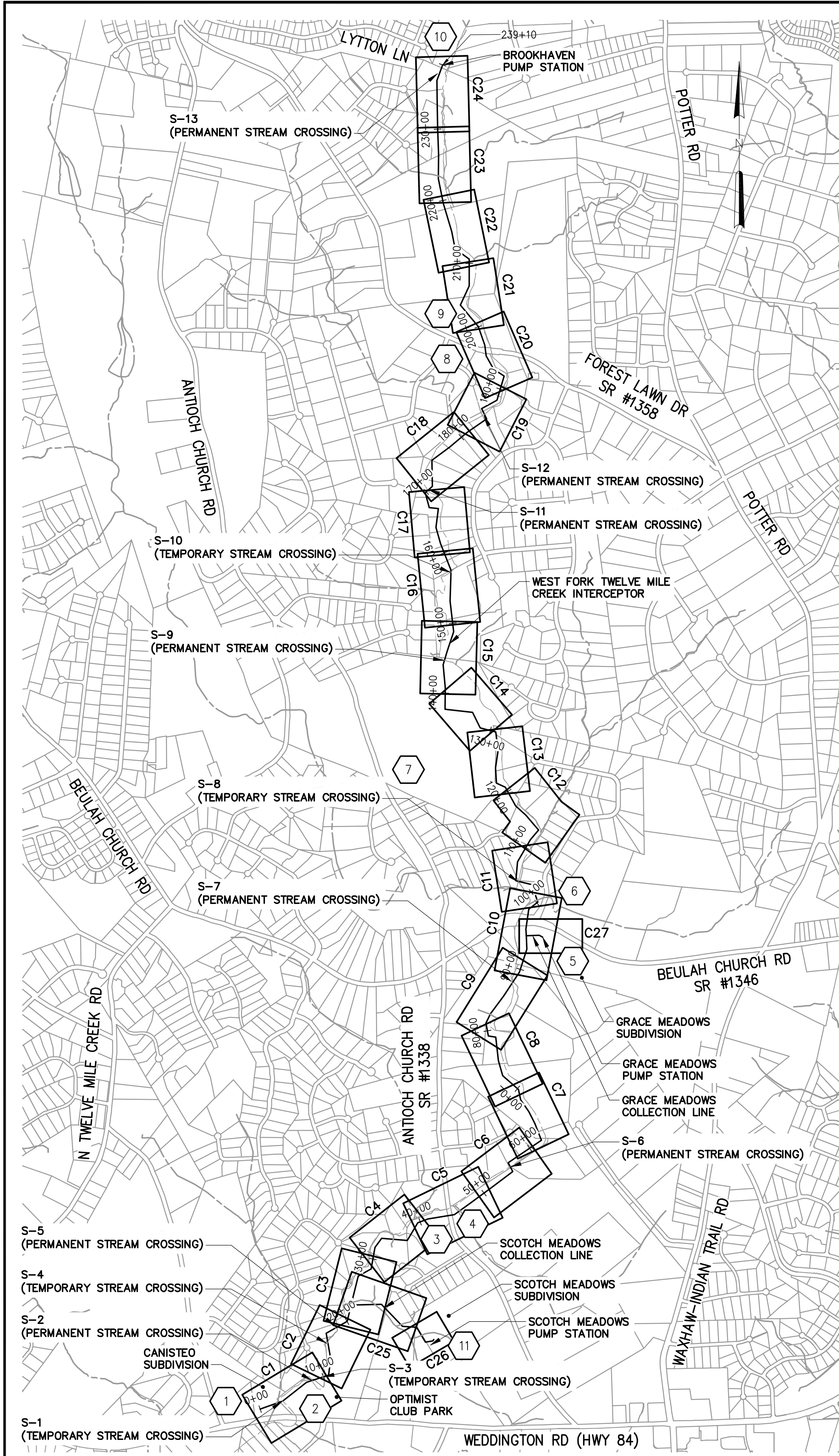


Hazen

HAZEN AND SAWYER
9101 SOUTHERN PINE BLVD, SUITE 250
CHARLOTTE, NORTH CAROLINA 28273
LICENSE NO. : C-0381



VICINITY MAP
SCALE : N.T.S.



PERMANENT/TEMPORARY CONSTRUCTION EASEMENT (PCE/TCE) PROPERTY OWNER INFORMATION								
R/W #	PID	OWNER(S)	LOCATION ADDRESS	MAILING ADDRESS	CITY	STATE	ZIP CODE	DB & PG
1	06072003E	DEAL ROAD VENTURES LLC (R-DEAN HARRILL)	5800 DEAL ROAD	5645 POTTER RD	MATTHEWS	NC	28104	DB 6909 PG 006
2	6096242	WESLEY CHAPEL WEDDINGTON ATHLETIC ASSOCIATION	HWY 84	PO BOX 79252	CHARLOTTE	NC	28271	DB 1648 PG 084
3	6069147	PAUL SCHNEIDER	4049 WHISPERWOOD CT	4049 WHISPERWOOD CT	MATTHEWS	NC	28104	
4	6069146	PAUL SCHNEIDER & WIFE DEBORAH R SCHNEIDER	WHISPERWOOD CT	4049 WHISPERWOOD CT	MATTHEWS	NC	28104	DB 1299 PG 060
5	6069145	MICHAEL L PARHAM & LEAH ERIN MOSS-PARHAM	4033 WHISPERWOOD CT	4033 WHISPERWOOD CT	MATTHEWS	NC	28104	DB 4882 PG 681
6	6069236	WILLIAM E HARVEY & WF SUSAN	2027 MEADOW RUN DR	2027 MEADOW RUN DR	MATTHEWS	NC	28104	
7	6069210	JAMES P SCANLON & MARIN SCANLON	2056 MEADOW RUN DR	2056 MEADOW RUN DR	MATTHEWS	NC	28104	DB 6873 PG 378
8	6069237	ENDO JEZEK & GENEVIEVE JEZEK	2028 MEADOW RD DR	2028 MEADOW RD DR	MATTHEWS	NC	28104	DB 6806 PG 703
9	06069237A	A WAYNE GRIFFIN & WIFE ANNA H GRIFFIN	ANTIOCH CHURCH RD	7000 HIGH MEADOW DR	MATTHEWS	NC	28104	DB 0880 PG 054
10	06069009C	PETER J COUCHELL (COUCHELL INVESTMENT COMPANY)	ANTIOCH CHURCH RD	3362 SMITH FARM RD	MATTHEWS	NC	28104	DB 3102 PG 362
11	06069006	PETER J COUCHELL	ANTIOCH CHURCH RD	3363 SMITH FARM RD	MATTHEWS	NC	28104	DB 1803 PG 160
12	06069006A	PETER J COUCHELL AND FAYE P COUCHELL	3362 SMITH FARM RD	5724 WAXHAW INDIAN TRAIL RD	MATTHEWS	NC	28104	
13	6069273	HUNTER TABONY & CIERRA TABONY	106 ANTIOCH PLANTATION DR	106 ANTIOCH PLANTATION DR	MATTHEWS	NC	28105	DB 6008 PG 244
14	6069272	STEPHANIE Y JOHNSON	108 ANTIOCH PLANTATION RD	108 ANTIOCH PLANTATION RD	MATTHEWS	NC	28104	DB 5506 PG 757
15	6069271	JACKIE L ISHAM & WIFE EVELYN C	110 ANTIOCH PLANTATION DR	110 ANTIOCH PLANTATION DR	MATTHEWS	NC	28104	DB 1491 PG 064
16	06069006D	PETER J COUCHELL & FAYE P	WAXHAW INDIAN TRAIL RD	3362 SMITH FARM RD	MATTHEWS	NC	28104	
17	06069003C	FRANK C OSBORNE	4816 ANTIOCH CHURCH RD	4816 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 4322 PG 287
18	06069003A	FLOYD C OSBORNE & WIFE SUSAN M OSBORNE	4724 ANTIOCH CHURCH RD	4724 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 1017 PG 770
19	06069003K	ANTHONY G BUTLER & KAROLYN J	WAXHAW INDIAN TRAIL RD	230 CHAUCER LN	MATTHEWS	NC	28104	DB 4605 PG 001
20	6042001	BEL AIR ACQUISITION SUB LLC	4994 WAXHAW INDIAN TRAIL RD	8601 N SCOTTSDALE RD STE 225	SCOTTSDALE	AZ	85253	DB 6480 PG 048
21	6066076	COBBLECREEK DRIVE HOMEOWNERS ASSOCI	COBBLE CREEK DR	7324 COBBLECREEK DR	MATTHEWS	NC	28104	DB 0947 PG 050
22	6066260	MICHAEL M KAYES & RANDI OWSELY KAYES	240 PEBBLESTONE LN	240 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 6674 PG 711
23	6066261	DAVID A DRUMMOND & WIFE NANCY B	248 PEBBLESTONE LN	248 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 1512 PG 803
24	6066262	GERALD A WEBER JR & WIFE KELLY L	256 PEBBLESTONE LN	256 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 1335 PG 398
25	6066057	JEFFREY K CALLAHAN & WENDY D CALLAHAN	7331 COBBLE CREEK DR	7331 COBBLE CREEK DR	MATTHEWS	NC	28104	DB 6123 PG 544
26	6066056	MIKEY L WALLS & WIFE CYNTHIA	7335 COBBLE CREEK DR	7335 COBBLE CREEK DR	MATTHEWS	NC	28104	DB 6887 PG 0766
27	6066053	EARL DEBERRY JR & WIFE CONNIE	7351 COBBLE CREEK DR	7351 COBBLECREEK DR	MATTHEWS	NC	28105	
28	6066052	DANIEL WRIGHT & LAUREN WRIGHT	7354 COBBLE CREEK DR	7354 COBBLE CREEK DR	WEDDINGTON	NC	28104	DB 6475 PG 747
29	6066051	STEVE H PHIFER	7352 COBBLE CREEK DR	7352 COBBLECREEK DR	MATTHEWS	NC	28105	DB 1085 PG 710
30	6066002	PCM HOLDINGS LLC	ANTIOCH CHURCH RD	188 N TRADE ST	MATTHEWS	NC	28105	DB 5881 PG 498
31	6066003	PHILLIP L COHN & WIFE BARBARA B	7240 FOREST RIDGE DR	7240 FOREST RIDGE DR	MATTHEWS	NC	28104	
32	6066187	RICHARD L COBB & VIRGINIA	FOREST RIDGE DR	7200 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 5156 PG 852
33	6066186	JEFFERY S TERRY & WIFE NICOLE C	7166 FOREST RIDGE DR	7166 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 1171 PG 177
34	6066185	DONALD SMITH & WIFE LINDA SMITH	7162 FOREST RIDGE DR	7162 FOREST RIDGE DR	MATTHEWS	NC	28105	DB 1005 PG 306
35	6066184	REBECCA V SHERIDAN	7158 FOREST RIDGE DR	7158 FOREST RIDGE DR	MATTHEWS	NC	28105	DB 1180 PG 127
36	6066183	KATHERINE J BANKS	7154 FOREST RIDGE DR	7154 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 4375 PG 787
37	6066181	RICHARD D SIMMONS & WF PHYLLIS I	7150 FOREST RIDGE DR	7150 FOREST RIDGE DR	MATTHEWS	NC	28105	
38	6066180	THOMAS E GAYE & WIFE LINDA J	7146 FOREST RIDGE DR	7142 FOREST RIDGE DR	MATTHEWS	NC	28105	
39	6066179	DAVID W CLOUD & WIFE CAROLYN V	7138 FOREST RIDGE DR	7138 FOREST RIDGE DR	MATTHEWS	NC	28104	
40	6066178	JAMES A LLOYD & WF JENNY D	7134 FOREST RIDGE DR	7134 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 1983 PG 209
41	6066177	ALAN J CAMHI & LYNDA A SCORDO	7130 FOREST RIDGE DR	7130 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 4765 PG 225
42	6066176	VADIM MOSHKOVSKY & YELENA MOCHKOVSKY	7126 FOREST RIDGE DR	7126 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 5548 PG 192
43	6066175	JEAN DANIEL CAUSSE & DIONNE R CAUSSE	7122 FOREST RIDGE DR	7122 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 6572 PG 611
44	6066174	PETER M ROLFE & WF ANNE T	7118 FOREST RIDGE DR	7118 FOREST RIDGE DR	MATTHEWS	NC	28104	
45	06063039A	VERONICA THOMAS HELMS	CEDAR BEND	3516 CEDAR BEND	MATTHEWS	NC	28104	DB 6494 PG 342
46	6063038	RICHARD GERALD KELLER III & JESSECA NICHOLE KELLER	3514 FOREST LAWN DR	3514 FOREST LAWN DR	WEDDINGTON	NC	28104	DB 5938 PG 756
47	06063001A	J & J PARTNERS LIMITED PARTNERSHIP (FOREST LAWN)	SR 1358	3700 FOREST LAWN DR	MATTHEWS	NC	28104	
48	7150017	J & J PARTNERS LIMITED PARTNERSHIP (FOREST LAWN)	FOREST LAWN DR	3700 FOREST LAWN DR	MATTHEWS	NC	28104	
49	7150015	BRENDA P HELMS & RICHARD WAYNE HELMS	3009 FOREST LAWN DR	3009 FOREST LAWN DR	MATTHEWS	NC	28104	DB 5740 PG 122
50	07150014A	GREYLYN HOMEOWNERS ASSOCIATION INC	GREYLYN DR	1248 GREYLYN DR	WEDDINGTON	NC	28104	
51	7150101	JEFFREY A LANDON & WIFE VICTORIA L	1248 GREYLYN DR	1248 GREYLYN DR	WEDDINGTON	NC	28104	DB 1229 PG 135
52	7150102	THOMAS E VAN SISTINE & WIFE MARY	1251 GREYLYN DR	1251 GREYLYN DR	MATTHEWS	NC	28104	DB 1081 PG 533
53	06069021A	WEDDINGTON OPTIMIST CLUB OF WAXHAW	HWY 84	P O BOX 522	WAXHAW	NC	28173	
54	06069022A	SOUTHBROOK COMMUNITY CHURCH (ATTN: GARY HADJIC)	5607 HWY 84	5607 MONROE WEDDINGTON RD	MATTHEWS	NC	28104	DB 3264 PG 187
55	6066263	TERRY L JARVIE AND WIFE SHERRI M JARVIE	239 PEBBLESTONE LN	239 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 0995 PG 109
56	6069003E	FLOYD C OSBORNE & WIFE SUSAN M OSBORNE	4724 ANTIOCH CHURCH RD	4724 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 5015 PG 808

DRAWING NO. DESCRIPTION
GENERAL

CVR COVER
X1 SHEET LAYOUT AND INDEX OF DRAWINGS
X2 LEGEND AND ABBREVIATIONS
X3 GENERAL AND EROSION CONTROL NOTES AND SEQUENCE
X4 ACCESS ROUTE 7

PLAN AND PROFILE
WEST FORK TWELVE-MILE CREEK INTERCEPTOR

C1 STA 0+00 TO STA 10+00
C2 STA 10+00 TO STA 20+00
C3 STA 20+00 TO STA 30+00
C4 STA 30+00 TO STA 40+00
C5 STA 40+00 TO STA 50+00
C6 STA 50+00 TO STA 60+00
C7 STA 60+00 TO STA 70+00
C8 STA 70+00 TO STA 80+00
C9 STA 80+00 TO STA 91+00
C10 STA 90+00 TO STA 100+00
C11 STA 100+00 TO STA 110+00
C12 STA 110+00 TO STA 120+00
C13 STA 120+00 TO STA 130+00
C14 STA 130+00 TO STA 140+00
C15 STA 140+00 TO STA 150+00
C16 STA 150+00 TO STA 160+00
C17 STA 160+00 TO STA 170+00
C18 STA 170+00 TO STA 181+00
C19 STA 181+00 TO STA 190+00
C20 STA 190+00 TO STA 200+00
C21 STA 200+00 TO STA 210+00
C22 STA 210+00 TO STA 220+00
C23 STA 220+00 TO STA 230+00
C24 STA 230+00 TO STA 239+10

SEWER TO SERVE SCOTCH MEADOWS

C25 STA 0+00 TO STA 10+00
C26 STA 10+00 TO STA 13+97

SEWER TO SERVE GRACE MEADOWS

C27 STA 0+00 TO STA 2+37

DEMOLITION PLANS

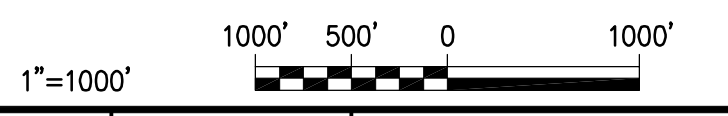
C28 SCOTCH MEADOWS PUMP STATION
C29 GRACE MEADOWS PUMP STATION
C30 BROOKHAVEN PUMP STATION

STANDARD DETAILS

D1 MISCELLANEOUS STANDARD DETAILS
D2 MISCELLANEOUS STANDARD DETAILS
D3 MISCELLANEOUS STANDARD DETAILS
D4 MISCELLANEOUS STANDARD DETAILS
D5 UNION COUNTY PUBLIC WORKS STANDARD DETAILS
D6 UNION COUNTY PUBLIC WORKS STANDARD DETAILS

REFERENCE DRAWINGS

R1-R9 REFERENCE DRAWING



DESIGNED	JOG
DRAWN	GWF
CHECKED	XXX
PROJ. ENGR.	JNS
APPROVED	



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**UNION COUNTY
NORTH CAROLINA**

**WEST FORK TWELVE-MILE CREEK
INTERCEPTOR**

SHEET LAYOUT AND INDEX OF DRAWINGS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE MAY 2018
H & S JOB NUMBER **30831-049**
CONTRACT NUMBER
DRAWING NUMBER **X1**

ABBREVIATIONS

APPROX ASPH	APPROXIMATE ASPHALT	JB	JUNCTION BOX
BLDG BOC	BUILDING BACK OF CURB	LAT	LATERAL
		LAV	LAVATORY
		LB	POUND/LINE BACK
		LF	LINEAR FEET
		LP	LIGHT POLE
		LOC	LIMITS OF CONSTRUCTION
CB	CATCH BASIN	MH	MANHOLE
CE	CONSTRUCTION EASEMENT	MIN	MINIMUM
CI	CAST IRON/CUBIC INCHES	MISC	MISCELLANEOUS
CIP	CAST IRON PIPE		
CL	CENTER LINE	N	NORTH
CLF	CHAIN LINK FENCE	NTS	NOT TO SCALE
CMP	CORRUGATED METAL PIPE		
CMU	CONCRETE MASONRY UNIT	R	PROPERTY LINE/PLATE
CO	CLEANOUT	PP	POWER POLE
CONC	CONCRETE	PVMT	PAVEMENT
CONST	CONSTRUCTION		
CONT	CONTINUOUS	QTY	QUANTITY
CONTR	CONTRACTOR	RCP	REINFORCED CONCRETE PIPE
		REQD	REQUIRED
		REV	REVISE
		RJ	RESTRAINED JOINT
		R/W	RIGHT OF WAY
		S	SOUTH/SLOPE
E	EAST/EASEMENT	SAN	SANITARY
EA	EACH	SCH	SCHEDULE
EIP	EXIST IRON PIPE	SD	STORM/SITE DRAIN
EL OR ELEV	ELEVATION	SEW	SEWER
ELEC	ELECTRIC/ELECTRICAL	SF	SQUARE FEET
ENGR	ENGINEER	SHT	SHEET
ENT	ENTRANCE	SPEC	SPECIFICATION
EOG	EDGE OF GRAVEL	SO	SQUARE
EOP	EDGE OF PAVEMENT	SS	SANITARY SEWER
EQ	EQUAL	ST	STREET
EX	EXISTING	STA	STATION
		STD	STANDARD
F&C	FRAME AND COVER	TEL	TELEPHONE
F&G	FRAME AND GRATE	TYP	TYPICAL
		UG	UNDERGROUND
		UTIL	UTILITY
GH	GAS/GAS LINE		
GC	GENERAL CONTRACTOR	W	WEST/WIDTH
GI	GALVANIZED IRON	W/	WITH
GR	GRADE	WL	WATER LINE
GW	GUY WIRE	WV	WATER VALVE
H	HEIGHT		
HORZ	HORIZONTAL		
I	IRON		
IN	INCH		
INV	INVERT		

LEGEND

LINETYPES	
	PROPOSED ITEMS
	EXISTING ITEMS
	HIDDEN ITEMS
	FEMA 100YR FLOODPLAIN
	FEMA FLOODWAY
	CENTER LINE
	MATCH LINE
	EASEMENT
	EXIST SANITARY SEWER
	EXIST MANHOLE
	NEW MANHOLE
	FENCE
	BRIDGE
	GUARDRAIL
	CURB & GUTTER
	STREET SIGN
	FIRE HYDRANT
	MAILBOX
	SOIL BORING
	GROUND ELEVATION
	POWER POLE
	POWER POLE W/GUY WIRE
	PLUG
	WATER MAIN
	FIBER OPTIC CABLE
	UNDERGROUND ELECTRIC
	UNDERGROUND COMMUNICATIONS
	GAS MAIN
	OVERHEAD ELECTRIC
	PROPERTY LINE
	RIGHT-OF-WAY
	DITCH, CREEK OR BRANCH
	STORM DRAIN W/CATCH BASIN OR DROP INLET
	STORM DRAIN CULVERT W/ HEADWALLS
	TREE LINE
	WETLANDS
	TEMPORARY CONSTRUCTION EASEMENT
	PERMANENT CONSTRUCTION EASEMENT
	SILT FENCE
	LIGHT POLE
	WATER VALVE
	IRON PIN (LOCATED)
	TREE
	TEMPORARY STREAM CROSSING
	FIBER FILTRATION TUBE (FFT)
	STABILIZED OUTLET FOR SILT FENCE
	PERMANENT STEAM CROSSING
	ACCESS GATE

SECTION AND DETAIL KEYING

DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING METHOD:

(A) A SECTION CUT ON DRAWING A3 IS IDENTIFIED AS FOLLOWS:

(B) THE SECTION SHOWN ON DRAWING A6 IS IDENTIFIED AS FOLLOWS:

DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT DETAILS ARE IDENTIFIED BY A SQUARE WITH A NUMBER IN THE UPPER HALF.

STANDARD DETAILS ARE REFERENCED BY A UNIQUE SEVEN DIGIT NUMBER AND ARE SHOWN ON THE CONTRACT DRAWINGS BY ONE OF TWO METHODS:

OR:

STANDARD DETAILS ARE COMPILED IN APPROXIMATE NUMERICAL ORDER IN THE BACK OF THE CONTRACT DRAWINGS ON THE D* DRAWINGS.

DESIGNED	JOG
DRAWN	GWF
CHECKED	XXX
PROJ. ENGR.	JNS
NO.	ISSUED FOR
	DATE
	BY
	APPROVED



Hazen

HAZEN AND SAWYER
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NORTH CAROLINA**

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INTERCEPTOR**

LEGEND AND ABBREVIATIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	X2

GENERAL AND EROSION CONTROL NOTES:

- A MINIMUM OF 5 WORKING DAYS PRIOR TO THE BEGINNING OF ANY WATER AND/OR SANITARY SEWER WORK, CONTACT THE UNION COUNTY PUBLIC WORKS PROJECT MANAGER, SCOTT HUNEYCUTT, AT 704-296-4211, AND AN INSPECTOR WILL BE PROVIDED FOR WORK OVERSIGHT.
- WHERE SANITARY SEWERS AND WATER LINES ARE ENCOUNTERED, THE CONTRACTOR SHALL USE CARE IN WORKING AROUND OR NEAR THEM. IF AN EXISTING SEWER OR WATER LINE IS DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY REPORT THE PROBLEM TO UNION COUNTY PUBLIC WORKS AND REPLACE THE SEWER OR WATER LINE WITH CLASS 350 DUCTILE IRON PIPE. THE CONTRACTOR SHALL REPLACE A MINIMUM OF 18 FEET OF SANITARY SEWER AND/OR WATER LINE WITH CLASS 350 DUCTILE IRON PIPE WHEN ANY OF THE MINIMUM SEPARATION DISTANCES OUTLINED IN THE SPECIAL PROVISIONS FOR THIS PROJECT ARE NOT MET.
- WATER AND SEWER MAINS ARE TO REMAIN ACTIVE DURING CONSTRUCTION. IF THIS IS NOT POSSIBLE, THE CONTRACTOR SHALL FOLLOW UNION COUNTY PUBLIC WORKS PROCEDURES AS OUTLINED IN THE DESIGN MANUAL AND SPECIAL PROVISIONS REGARDING OUTAGES, TEMPORARY WATER SERVICE AND BYPASS SEWER PUMPING. SOME WATER, SEWER, AND GAS MAINS WERE VACUUM EXCAVATED TO DETERMINE APPROXIMATE DEPTH. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL CROSSING UTILITIES WELL IN ADVANCE OF HIS WORK.
- ALL WORK SHALL COMPLY WITH CONTRACT DOCUMENTS AND THE SPECIAL PROVISIONS AS DESCRIBED IN THE CONTRACT DOCUMENTS.
- CONTRACTOR SHALL CONTACT THE LOCAL PUBLIC UTILITIES LOCATING SERVICE TO LOCATE UTILITIES IN THE AREA PRIOR TO ANY EXCAVATION. ALL EXISTING UTILITIES MAY NOT BE SHOWN ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES, WHETHER SHOWN OR NOT, AND REPAIRING ALL DAMAGE TO UTILITIES AT HIS OWN EXPENSE. CONTACT NC ONE CALL AT 811 OR 800-632-4949.
- THE TOPOGRAPHIC MAPS WERE PREPARED FROM AN AERIAL SURVEY -CONTOUR INTERVAL OF 1 FOOT. GRID SYSTEM AND COORDINATES ARE NC STATE PLANE COORDINATE SYSTEM (1983 DATUM).
- CONTRACTOR IS RESPONSIBLE FOR PROCURING ALL REQUIRED PERMITS, MOBILIZATION, STORAGE, AND STAGING AREAS AS WELL AS ACCESS TO ANY CONSTRUCTION SITES WITHIN TEMPORARY AND PERMANENT UNION COUNTY PUBLIC WORKS RIGHT-OF-WAY NOT ALREADY ACQUIRED. EROSION CONTROL DEVICES SHALL BE INSTALLED AND MAINTAINED AT ALL WORK SITES, STAGING AREAS, AND OFF SITE SPOIL AREAS. CONTRACTOR SHALL FOLLOW ALL LOCAL REGULATIONS REGARDING THE WORK, INCLUDING KEEPING MUD AND DIRT OFF OF PRIVATE ENTRANCES, AND REHABILITATING STAGING, STORAGE OR STOCKPILING AREAS TO EQUAL OR BETTER THAN EXISTING CONDITION. CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO PREVENT TRACKING MUD/SOIL ON ADJACENT ROADWAYS. ANY MUD/SOIL TRACKED ON ROADWAYS SHALL BE CLEANED DAILY. CONTRACTOR IS RESPONSIBLE FOR PROCURING ALL PERMITS FOR THESE ADDITIONAL AREAS.
- EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CLEARING OR PERFORMING EXCAVATION IN ANY AREA. EROSION CONTROL FACILITIES SHALL BE MAINTAINED DURING WORK AND SHALL BE REMOVED WHEN WORK IS COMPLETED AND ENGINEER AUTHORIZES REMOVAL. TEMPORARY SEEDING AND MULCHING SHALL BE PERFORMED AS SPECIFIED IN SECTION 02276 - EROSION AND SEDIMENTATION CONTROL.
- CONTRACTOR SHALL NOTIFY MONROE ENERGY SERVICES OR PIEDMONT NATURAL GAS AT LEAST 48 HOURS PRIOR TO ENCRACHING ON OR CROSSING ANY GAS PIPELINE. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS WITH THE VARIOUS UTILITIES TO PROTECT THE GAS PIPELINES AND THE PUBLIC.
- SOIL EXPLORATION WORK WAS PERFORMED BY S&ME. SOILS EXPLORATION WORK IS SOLELY TO ASSIST BIDDERS IN ASSESSING THE NATURE AND EXTENT OF TESTING PROCEDURES REQUIRED TO MAKE THEIR OWN DETERMINATION OF ACTUAL SUBSURFACE CONDITIONS THAT WILL BE ENCOUNTERED DURING THE COURSE OF THE WORK. NO REPRESENTATION IS MADE OR WILL BE GIVEN BY THE ENGINEER CONCERNING ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED. ALL BIDDERS ARE DIRECTED PRIOR TO BIDDING TO CONDUCT ALL INVESTIGATIONS AND TESTING THEY DEEM NECESSARY TO ARRIVE AT THEIR OWN CONCLUSIONS REGARDING SUCH CONDITIONS. SOIL BORING PROFILE ELEVATIONS ARE APPROXIMATE.
- ALL AREAS WITH OPEN EXCAVATIONS, OPEN VAULTS OR MANHOLES, OR EQUIPMENT SHALL BE FENCED WITH TEMPORARY SAFETY FENCING AT LEAST 4 FEET HIGH AT END OF EACH WORK DAY.
- WHEN DEWATERING BORE PITS AND TRENCHES, TURBID WATER SHALL BE PUMPED THROUGH A FILTER BAG, PER DETAIL 0227038.
- ANY LAND CORNER, PROPERTY MONUMENTATION, OR BENCHMARK WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED, THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY. ANY CORNER MONUMENT DISTURBED OR DESTROYED SHALL BE RESET BY A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF NC AT THE CONTRACTOR'S EXPENSE. CONTRACTOR TO PROTECT OR REPLACE NCDOT RIGHT-OF-WAY MARKERS OR MONUMENTS PER NCDOT 806.01.
- CONTACT THE OWNER IMMEDIATELY REGARDING ANY CONFLICTS THAT ARISE DURING CONSTRUCTION OF WORK SHOWN ON THE DRAWINGS.
- THE CONTRACTOR SHALL ADHERE TO ALL CONDITIONS AND REQUIREMENTS OF ALL PERMITS THAT HAVE BEEN OBTAINED AND ALL AVAILABLE LOCAL, STATE AND FEDERAL REGULATIONS. SEE CONTRACT SPECIFICATIONS.
- ALL VAULTS AND MANHOLES WITHIN ROAD RIGHT-OF-WAY SHALL BE DESIGNED FOR HS20 LOADING.
- FOR ALL CONNECTIONS TO EXISTING FACILITIES, CONTRACTOR SHALL VERIFY ALL EXISTING PIPELINE ELEVATIONS, LOCATIONS, DIAMETERS, AND MATERIALS PRIOR TO SHOP DRAWING SUBMITTALS, NOTIFYING THE ENGINEER OF ANY CONFLICTS.
- ALL DRIVEWAYS, DRAIN PIPES, AND HEADWALLS DISTURBED SHALL BE RESTORED TO EQUAL OR BETTER THAN EXISTING CONDITION, IN BOTH NEW AND EXISTING RIGHTS-OF-WAY AND WITHIN ANY TEMPORARY EASEMENT AREAS. ANY STRUCTURES OR DRIVEWAYS DISTURBED OUTSIDE THE RIGHT-OF-WAY OR EASEMENT SHALL ALSO BE FULLY RESTORED AT NO COST TO THE OWNER.
- CONTRACTOR SHALL PROTECT ALL DRAIN CULVERTS DURING CONSTRUCTION. MAINTAIN PROTECTION UNTIL DISTURBED AREAS ARE STABILIZED WITH GROUND COVER SUFFICIENT TO RESTRAIN EROSION.
- PROVIDE TEMPORARY DITCH LINING FOR DISTURBED DITCH LINES OR OTHER AREAS OF CONCENTRATED FLOW WHERE SLOPE IS GREATER THAN 2%.
- WHEN EXCAVATED MATERIALS ARE PLACED ON ROADWAY OR PARKING LOT SURFACES, THE CONTRACTOR SHALL PLACE SAND, STONE SCREENINGS, OR GEOTEXTILE ON THE SURFACE PRIOR TO PLACING THE EXCAVATED MATERIALS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING SITE ACCESSIBLE FOR EMERGENCY VEHICLES AT ALL TIMES.
- CONTRACTOR TO EXCAVATE AND DETERMINE ELEVATION OF ALL KNOWN CONFLICTS AT LEAST 1000 FEET AHEAD OF PIPE OR CASING INSTALLATION.
- CLASS B CONCRETE MIX DESIGN SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3600 psi.
- DISTURBANCE SHALL BE LIMITED TO THE TEMPORARY AND PERMANENT RIGHT-OF-WAY, AREAS FOR WHICH ENCRACHMENT AGREEMENTS HAVE BEEN OBTAINED AND STAGING AREAS PROCURED BY THE CONTRACTOR. CONTRACTOR SHALL REMOVE ALL TREES WITHIN THE LIMITS OF THE PERMANENT UNION COUNTY PUBLIC WORKS RIGHT-OF-WAY, EXCEPT WHERE TREE PROTECTION IS SHOWN ON THE DRAWINGS.
- LIMITS OF CONSTRUCTION (LOC) TO BE EDGE OF TEMPORARY CONSTRUCTION EASEMENT (TCE), EDGE OF PAVEMENT (EOP) OR SILT FENCE LINE (OPEN AREAS) AS INDICATED ON INDIVIDUAL DRAWINGS.
- LIMITS OF DISTURBANCE FOR THIS PROJECT IS APPROXIMATELY 12.3 ACRES.
- ALL MANHOLES WITH RIMS LESS THAN OR EQUAL TO 2- FEET ABOVE THE FEMA 100 YEAR BASE FLOOD ELEVATION ARE TO HAVE SEALED RINGS AND COVERS PER DETAIL 9A.
- CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING ALL UTILITY POLES DURING CONSTRUCTION WITHIN PROJECT LIMITS.
- ALL LAWN AREAS SHALL RECEIVE MIN 6" TOPSOIL PRIOR TO SEEDING AND MULCHING.

EROSION CONTROL SEQUENCE:

- NO DEMOLITION, CONSTRUCTION OR LAND DISTURBANCE ACTIVITIES MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED IN LOCATIONS AS SHOWN ON THE CONTRACT DRAWINGS. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL OTHER MEASURES SHOWN SHALL BE INSTALLED FIRST. THE CLEARING OF THE LAND NECESSARY FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
- ONCE ALL MEASURES HAVE BEEN INSTALLED, THE SITE SHALL BE CLEARED AND GRUBBED AS NECESSARY WITHIN THE LIMITS OF DISTURBANCE AS SHOWN ON THE CONTRACT DRAWINGS. EFFORTS SHALL BE MADE TO MINIMIZE THE AMOUNT OF CLEARED AREA EXPOSED AT ANY GIVEN TIME.
- ONCE CLEARING AND GRUBBING IS COMPLETE, ANY NECESSARY TOPSOIL STRIPPING MAY BEGIN. TOPSOIL SHALL BE STOCKPILED ON SITE IN THE STOCKPILING AREAS SHOWN ON THE CONTRACT DRAWINGS. STOCKPILE SHALL RECEIVE SUCH TEMPORARY SEEDING MEASURES AS MAY BE REQUIRED. ANY SOIL TAKEN OFFSITE SHALL BE STOCKPILED AT LOCATIONS WITH ALL REQUIRED PERMITS. IF OFFSITE LOCATION DOES NOT HAVE ALL REQUIRED PERMITS, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY REQUIRED PERMITS.
- DEMOLITION, EARTHWORK AND CONSTRUCTION OPERATIONS MAY BEGIN ONCE TOPSOIL HAS BEEN REMOVED AND STOCKPILED.
- EROSION CONTROL DEVICES SHALL BE INSTALLED AND MAINTAINED AT ALL WORK SITES, STAGING AREAS, AND OFF SITE SPOIL AREAS.
- EROSION AND SEDIMENTATION CONTROL FACILITIES SHALL BE INSTALLED PRIOR TO CLEARING OR PERFORMING EXCAVATION IN ANY AREA. EROSION CONTROL FACILITIES SHALL BE MAINTAINED DURING WORK AND SHALL BE REMOVED WHEN WORK IS COMPLETED. SUFFICIENT GROUND COVER IS ESTABLISHED AND ENGINEER AUTHORIZES REMOVAL. TEMPORARY SEEDING AND MULCHING SHALL BE PERFORMED AS SPECIFIED IN SECTION 02276 - EROSION AND SEDIMENTATION CONTROL.
- INLET PROTECTION IS REQUIRED FOR ALL INLETS LOCATED IN THE WORKING AREA AND ADJACENT AREAS AND REQUIRED UNTIL THE SITE IS FULLY STABILIZED.
- PERMANENT AND TEMPORARY STREAM CROSSINGS SHALL BE INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS FOR CONSTRUCTION ACCESS ACROSS STREAMS.
- PIPELINE INSTALLATION THROUGH EXISTING ASPHALT ROADWAYS SHALL UTILIZE PIPE BORING, JACKING, AND OPEN CUT OF ROADWAYS, AS SHOWN ON THE CONTRACT DRAWINGS.
- ALL PIPES SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD CONSTRUCTION TECHNIQUES. ONLY THE LENGTH OF TRENCH IN WHICH PIPE CAN BE INSTALLED IN ONE DAYS TIME SHALL BE OPEN AT ANY TIME, WITH SPOIL MATERIAL PLACED ON THE UPHILL SIDE OF THE TRENCH. PIPING SHALL BE CAPPED AT END OF EACH DAYS WORK TO PREVENT SEDIMENT FROM ENTERING. ALL OPEN CUT PIPELINE TRENCHES SHALL BE BACKFILLED AT END OF WORK WEEK. DISTURBED AREA SHALL BE SEEDDED AND MULCHED WITHIN SEVEN (7) DAYS OF BACKFILL.
- ALL PIPING AROUND EXISTING STRUCTURES SHALL HAVE EXCAVATION SUPPORT DURING INSTALLATION TO MAINTAIN THE INTEGRITY OF THE EXISTING STRUCTURES.
- ONCE CONSTRUCTION ACTIVITIES ARE COMPLETE, FINAL GRADING MAY BEGIN.
- CONSTRUCTION ENTRANCES SHALL REMAIN IN PLACE UNTIL FINAL STABILIZATION HAS BEEN ACHIEVED OR UNTIL ALL MAJOR GRADING ACTIVITIES HAVE CEASED, AND NEW ROADWAYS ARE PAVED. ANY MUD/SOIL TRACKED ON ROADWAYS SHALL BE CLEANED DAILY.
- UPON COMPLETION OF FINAL GRADING, PERMANENT SEEDING, MULCHING AND FERTILIZING MEASURES SHALL BE EMPLOYED ON ALL DISTURBED AREAS AS PER SECTION 02910 -FINAL GRADING AND LANDSCAPING. PERMANENT SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN (7) DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. ALL EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ENTIRE SITE HAS BEEN STABILIZED.
- ONCE PERMANENT STABILIZATION HAS OCCURRED, TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE REMOVED. ANY AREAS DISTURBED BY THE REMOVAL OF THESE MEASURES SHALL BE RETURNED AS CLOSELY AS POSSIBLE TO ORIGINAL CONDITION AND SEEDDED, MULCHED AND FERTILIZED AS PER SPECIFICATION SECTION 02910.
- ADDITIONAL SILT FENCE AND SILT FENCE STONE OUTLETS MAY BE REQUIRED BASED ON FIELD CONDITIONS AS APPROVED BY ENGINEER.

CONSTRUCTION SEQUENCE:

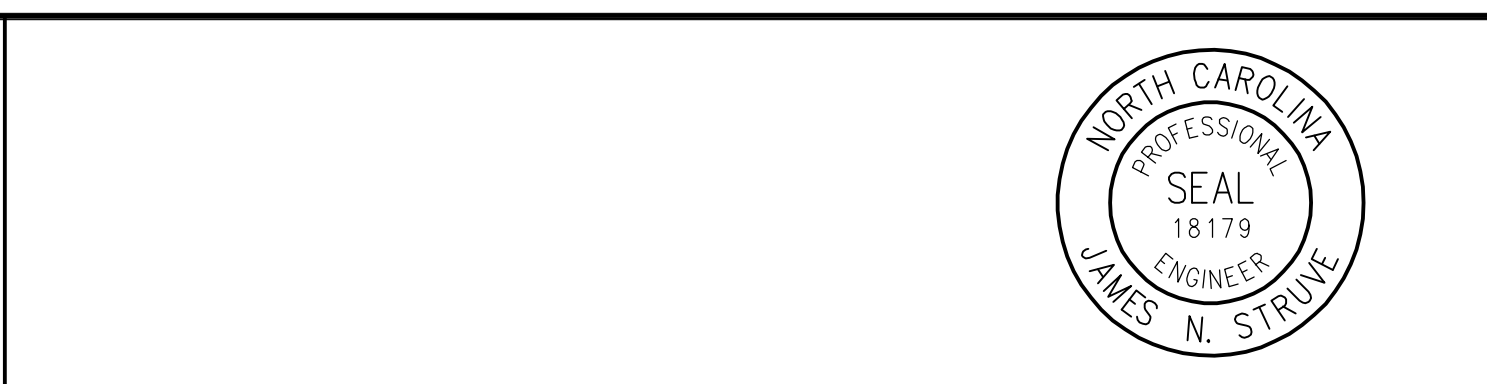
- CONTRACTOR TO HAVE SEDIMENTATION AND EROSION CONTROL MEASURES IN PLACE PRIOR TO ANY LAND DISTURBING ACTIVITY.
- CONTRACTOR TO NOTIFY ALL AFFECTED PROPERTY OWNERS MINIMUM 3 DAYS IN ADVANCE OF WORKING ON THEIR PROPERTY. ACTUAL CONTACT WITH OWNER OR DOOR HANGERS SHOULD BE USED.
- CLEARING WITHIN THE TEMPORARY EASEMENTS (TCE) SHALL BE LIMITED TO CLEARING ONLY WHAT'S ABSOLUTELY NECESSARY FOR CONTRACTOR'S WORK.
- THE CONTRACTOR SHALL KEEP AREA AS CLEAN AND NEAT AS POSSIBLE AT ALL TIMES.
- UPON COMPLETION AND ACCEPTANCE OF PROJECT, CONTRACTOR SHALL REMOVE ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES.
- ONCE CONSTRUCTION ACROSS EACH STREAM/CREEK IS COMPLETED, INSTALL SILT FENCE AND/OR ADDITIONAL MEASURES ADJACENT TO THE STREAM/CREEK UNTIL THE AREA IS STABILIZED.

DUKE ENERGY NOTES:

- NO STOCKPILING OF ANY MATERIALS WITHIN THE DUKE ENERGY TRANSMISSION EASEMENT AT ANY TIME.
- DUKE ENERGY SHALL HAVE FREE AND CLEAR INGRESS/EGRESS TO ITS FACILITIES AT ALL TIMES.
- ALL CROSSING MATERIALS SHALL BE ABLE TO WITHSTAND 80K POUNDS.
- ALL CROSSINGS SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO 95% AT END OF EACH DAY.
- DUKE ENERGY SHALL NOT BE RESPONSIBLE FOR ANY DAMAGE TO CONSTRUCTION MATERIALS WITHIN THE TRANSMISSION EASEMENT.
- ALL EROSION CONTROL DEVICES WITHIN DUKE ENERGY'S TRANSMISSION EASEMENT SHALL BE REMOVED UPON COMPLETION AND ACCEPTANCE OF PROJECT. VEGETATION MUST BE RE-ESTABLISHED IN DUKE ENERGY'S TRANSMISSION EASEMENT IF DAMAGED.
- ALL WORK WITHIN DUKE ENERGY'S TRANSMISSION EASEMENT SHALL COMPLY WITH DUKE'S GUIDELINES AND RESTRICTIONS, CLEARANCES AND OSHA REGULATIONS.



DESIGNED	JOG
DRAWN	GWF
CHECKED	XXX
PROJ. ENGR.	JNS
NO.	ISSUED FOR
	DATE
	BY
	APPROVED



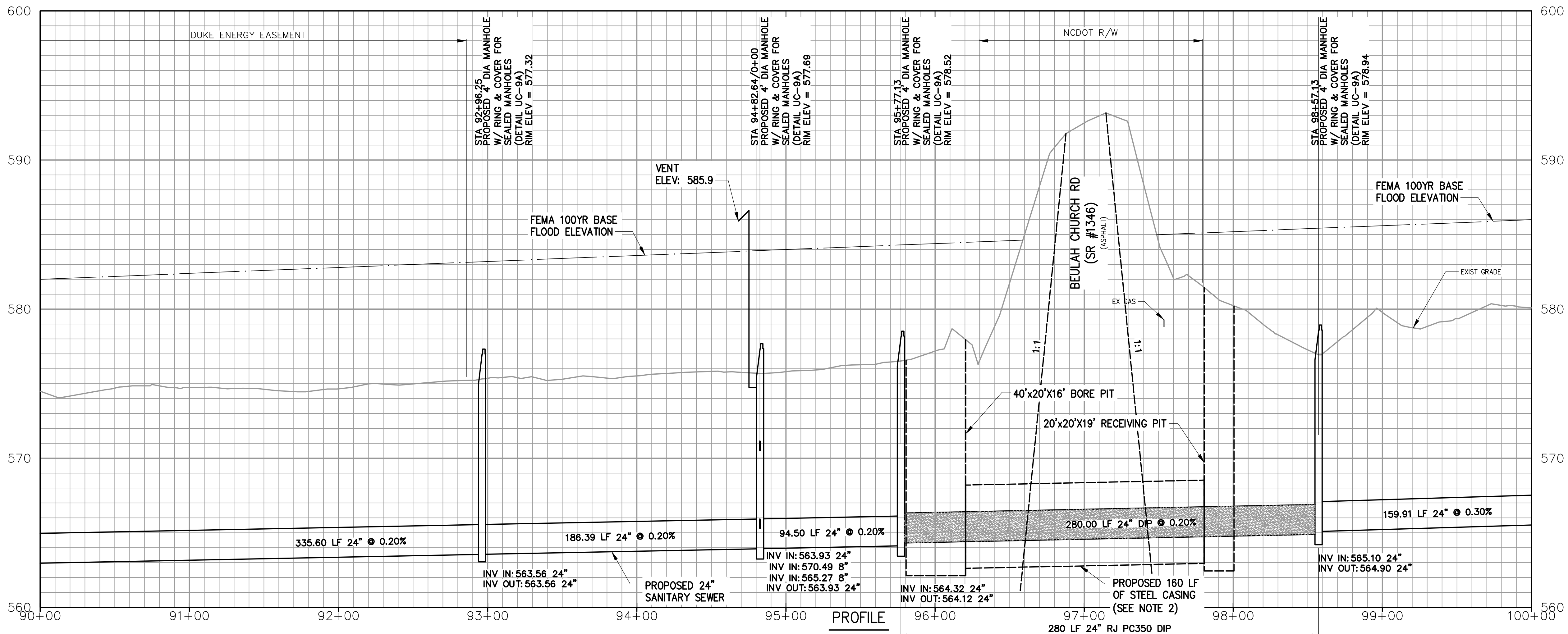
Hazen
 HAZEN AND SAWYER
 9101 SOUTHERN PINE BLVD, SUITE 250
 CHARLOTTE, NORTH CAROLINA 28273
 LICENSE NO. : C-0381

**UNION COUNTY
 NORTH CAROLINA**

**WEST FORK TWELVE-MILE CREEK
 INTERCEPTOR**

**GENERAL AND EROSION CONTROL
 NOTES AND SEQUENCE**

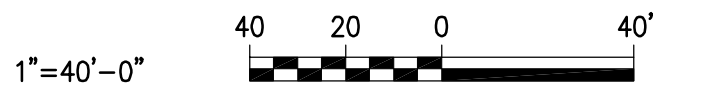
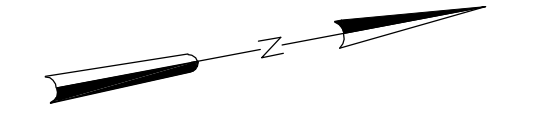
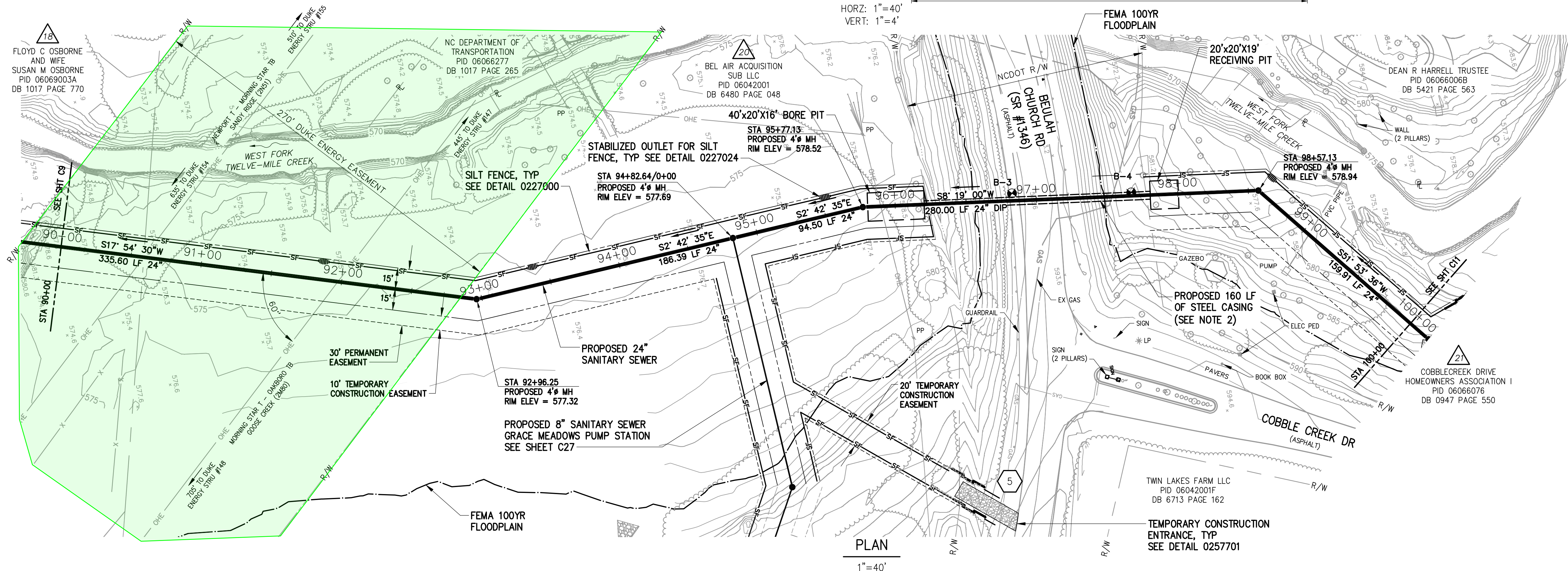
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE MAY 2018
	H & S JOB NUMBER 30831-049
	CONTRACT NUMBER
	DRAWING NUMBER X3



NOTES:

- SEE DUKE ENERGY NOTES ON SHEET X3 FOR WORK WITHIN DUKE ENERGY TRANSMISSION EASEMENT.
- CONTRACTOR SHALL HAVE THE OPTION OF SELECTING CASING SIZE BASED UPON HIS AVAILABLE BORING/TUNNELING EQUIPMENT PER THE THREE (3) CASING DIAMETER AND ASSOCIATED CASING THICKNESS INDICATED IN THE TABLE BELOW. THE PRICE FOR THE SELECTED CASING DIAMETER/THICKNESS AND INSTALLATION OF THE ASSOCIATED GUARANTEED BORE/TUNNEL SHALL BE INDICATED IN PAY ITEM X.

CASING SIZE (INCHES)	CASING THICKNESS (INCHES)
48	0.750
54	0.875
60	0.875



DESIGNED	JOG
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PROJ. ENGR.	JNS
NO.	ISSUED FOR
	DATE
	BY
	APPROVED

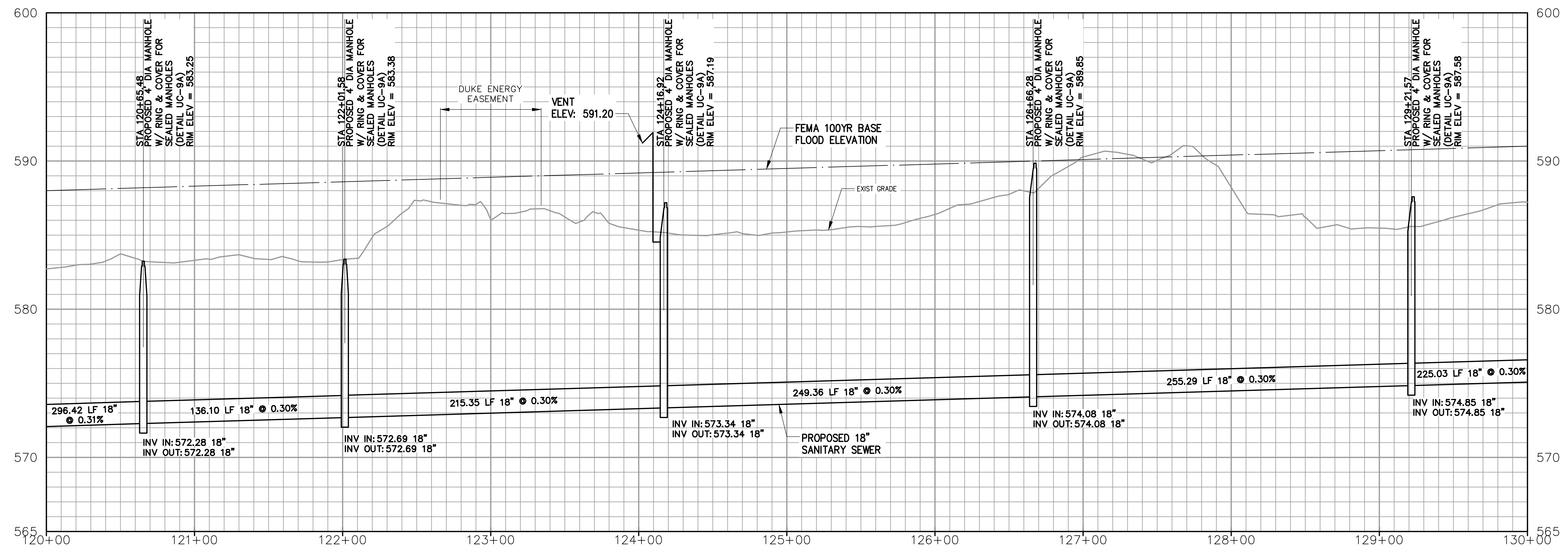


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HAZEN AND SAWYER
9101 SOUTHERN PINE BLVD, SUITE 250
CHARLOTTE, NORTH CAROLINA 28273
LICENSE NO. : C-0381

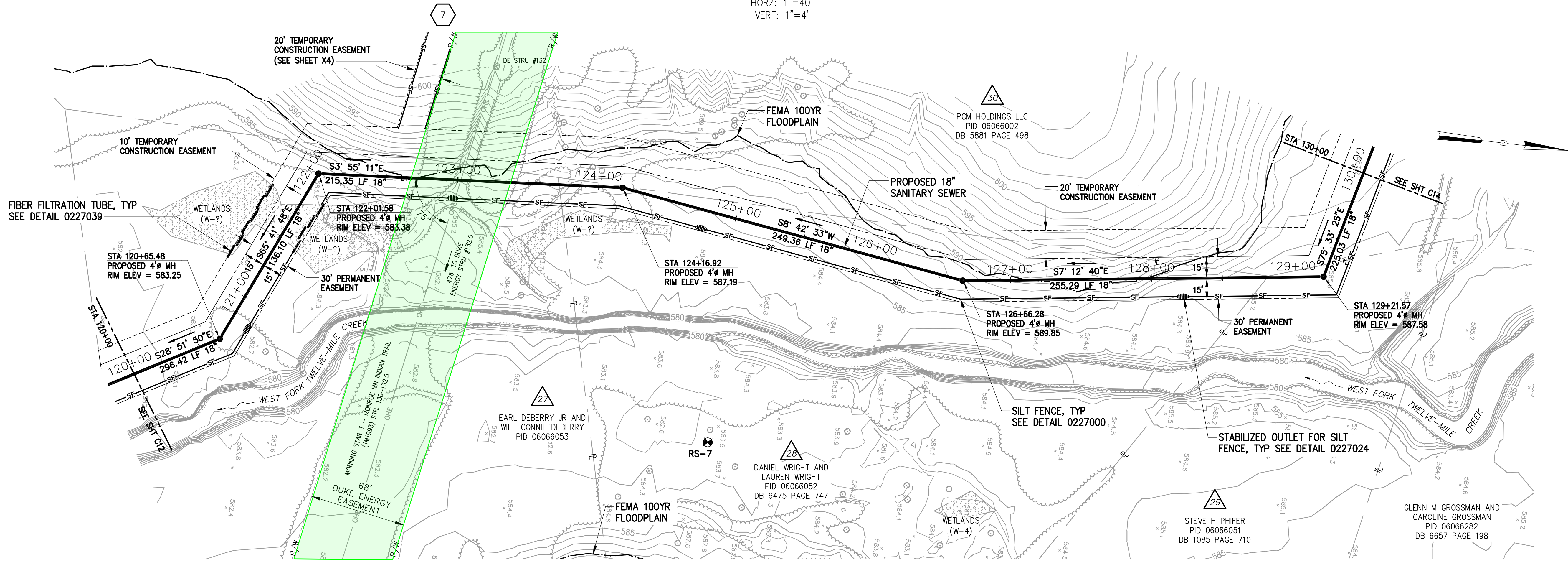
**UNION COUNTY
NORTH CAROLINA**
**WEST FORK TWELVE-MILE CREEK
INTERCEPTOR**

**WEST FORK TWELVE-MILE CREEK
INTERCEPTOR**
STA 90+00 TO STA 100+00

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	C10

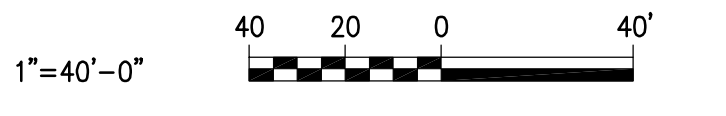
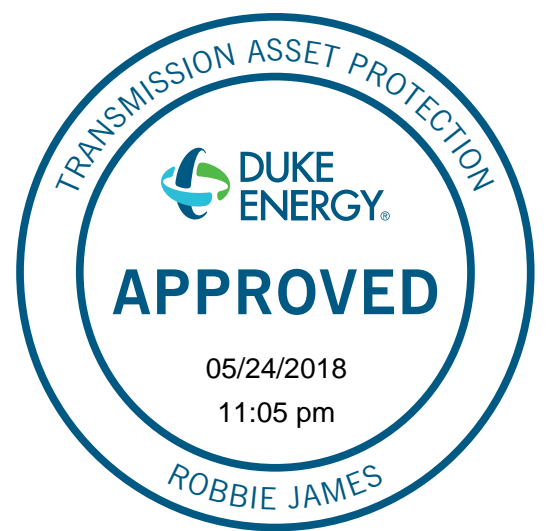


PROFILE
 HORZ: 1"=40'
 VERT: 1"=4'



PLAN
 1"=40'

NOTES:
 1. SEE DUKE ENERGY NOTES ON SHEET X3 FOR WORK WITHIN DUKE ENERGY TRANSMISSION EASEMENT.



DESIGNED	JOG
DRAWN	GWF
CHECKED	XXX
PROJ. ENGR.	JNS
NO.	ISSUED FOR
	DATE
	BY
	APPROVED



Hazen
 HAZEN AND SAWYER
 9101 SOUTHERN PINE BLVD, SUITE 250
 CHARLOTTE, NORTH CAROLINA 28273
 LICENSE NO. : C-0381

UNION COUNTY
 NORTH CAROLINA
 WEST FORK TWELVE-MILE CREEK
 INTERCEPTOR

WEST FORK TWELVE-MILE CREEK
 INTERCEPTOR
 STA 120+00 TO STA 130+00

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	C13

DUKE ENERGY ELECTRIC TRANSMISSION RIGHT-OF-WAY GUIDELINES/RESTRICTIONS VALID FOR NORTH CAROLINA AND SOUTH CAROLINA (Revised 11/20/2014)

This list of right-of-way restrictions has been developed to answer the most frequently asked questions about property owner use of Duke Energy's electric transmission rights of way. This list does not cover all restrictions or all possible situations. You should contact the Asset Protection right-of-way specialist if you have additional concerns about the rights of way. This list of restrictions is subject to change at any time and without notice. Duke Energy reserves all rights conveyed to it by the right-of-way agreement applicable to the subject property. All activity within the rights of way shall be reviewed by an Asset Protection right-of-way specialist to obtain prior written approval. Engineering plans may be required. Compliance with the Duke Energy Right-of-Way Guidelines/Restrictions or approval of any plans by Duke Energy does not mean that the requirements of any local, county, state or federal government or other applicable agency with governing authority have been satisfied.

1. Structures, buildings, manufactured/mobile homes, satellite systems, swimming pools (any associated equipment and decking), graves, billboards, dumpsters, signs, wells, deer stands, retaining walls, septic systems or tanks (whether above or below ground), debris of any type, flammable material, building material, wrecked or disabled vehicles and all other objects (whether above or below ground) which in Duke Energy's opinion interfere with the electric transmission right of way are not allowed within the right-of-way limits. Transformers, telephone/cable pedestals (and associated equipment) and fire hydrants are not allowed. Manholes, water valves, water meters, backflow preventers and irrigation heads are not permitted. Attachments to Duke Energy structures are prohibited.
2. Fences and gates shall not exceed 10 feet in height and shall be installed greater than 25 feet from poles, towers and guy anchors. Fences shall not parallel the centerline within the rights of way but may cross from one side to the other at any angle not less than 30 degrees with the centerline. If a fence crosses the right of way, a gate (16 feet wide at each crossing) shall be installed by the property owner, per Duke Energy's specifications. The property owner is required to install a Duke Energy lock on the gate to ensure access. Duke Energy will supply a lock.
3. Grading (cuts or fill) shall be no closer than 25 feet from poles, towers, guys and anchors (except for parking areas; see paragraph 7) and the slope shall not exceed 4:1. Grading or filling near Duke Energy facilities which will prevent free equipment access or create ground-to-conductor clearance violations will not be permitted. Storage or stockpiling of dirt or any other material is prohibited. Sedimentation control, including re-vegetation, is required per state regulations.
4. Streets, roads, driveways, sewer/water lines, other utility lines or any underground facilities shall not parallel the centerline within the right of way but may cross, from one side to the other, at any angle not less than 30 degrees with the centerline. No portion of such facility or corresponding easement shall be located within 25 feet of Duke Energy's facilities. Roundabouts, cul-de-sacs and intersections (such as roads, driveways and alleyways) are not permitted.
5. Any drainage feature that allows water to pond, causes erosion, directs stormwater toward the right of way or limits access to or around Duke Energy facilities is prohibited.
6. Contact Duke Energy prior to the construction of lakes, ponds, retention or detention facilities, etc.
7. Parking may be permitted within the right of way, provided that:
 - a. Prior to grading, concrete barriers shall be installed at a minimum of 9 feet from the Duke Energy facilities. During construction, grading shall be no closer than 10 feet to any Duke Energy facility.
 - b. After grading/paving activity is complete, a Duke Energy-approved barrier sufficient to withstand a 15-mph vehicular impact shall be erected 9 feet from any Duke Energy facility.
 - c. Any access areas, entrances or exits shall cross (from one side to the other) the right of way at any angle not less than 30 degrees with the centerline and shall not pass within 25 feet of any structure. Parking lot entrances/exits cannot create an intersection within the right of way.
 - d. Lighting within the right-of-way limits must be approved by Duke Energy before installing. Due to engineering design standards, lighting is not allowed in the "Wire Zone." Where lighting is approved ("Border Zone"), the total height may not exceed 15 feet in Area A and 12 feet in Area B. See map on back of this page for Areas. Contact your Asset Protection right-of-way specialist as the "Wire Zone" varies for the different voltage lines.
8. Duke Energy will not object to certain vegetation plantings as long as:
 - a. They do not interfere with the access to or the safe, reliable operation and maintenance of Duke Energy facilities.
 - b. With prior written approval, Duke Energy does not object to low-growing shrubs and grasses within the "Wire Zone." Tree species are not allowed within the "Wire Zone." Trees that are approved in the "Border Zone" may not exceed, at maturity, 15 feet in Area A and 12 feet in Area B. See map on back of page for areas. Contact the Asset Protection right-of-way specialist for "Wire Zone"/"Border Zone" definitions.
 - c. For compliant mature height species, refer to plants.ces.ncsu.edu/ for reference.
 - d. Engineering drawings must indicate the outermost conductor.
 - e. Vegetation that is not in compliance is subject to removal without notice.
 - f. Duke Energy may exercise the right to cut "danger trees" outside the right-of-way limits as required to properly maintain and operate the transmission line.

We hope this is useful information. If you have additional questions or plan any activity not mentioned above, please contact the Asset Protection right-of-way specialist for your area (see map).

Duke Energy North Carolina and South Carolina Transmission Asset Protection Zones

Area A and Area B have different right-of-way restrictions related to tree and light heights. Please refer to the attached Right-of-Way Restrictions Guide for more information.



— Area divider

Asset Protection Right-of-Way Specialist Zones

- | | | |
|--|---|---|
| ■ Zone 1 – Craig Garrett 828.258.5018 | ■ Zone 4 – Ervin Summers 336.634.4633 | ■ Zone 6 – Robbie James 910.944.5363 |
| ■ Zone 2 – Steven Pryor 864.948.5610 | ■ Zone 5 – Robbie James 910.944.5363 | ■ Zone 7 – Bruce Pait 919.329.5928 |
| | | ■ Zone 8 – Bill Wilder 910.772.4903 |
| | | ■ Zone 3 – Stephen Lord 704.812.2316 |

Legend – updated 5/13/16





Your safety is our priority

We have a goal at Duke Energy – to eliminate injury and death from needless power line contacts. We want to provide you with the information you need to stay safe at work.

Important OSHA minimum approach regulation

The following table is from OSHA 1910.333 and applies to nonqualified persons working in proximity to energized power lines. The minimum approach distance is to be maintained for nonqualified workers. When using equipment classified as a crane or derrick, OSHA 29 CFR 1926.1407-1411 must be followed.

OSHA - 1910.333 Applies to NonQualified Persons Minimum Approach Distance	
Up to 50 kV	10 Feet
50 kV up to 200 kV	15 Feet
200 kV up to 350	20 Feet
350 to 500 kV	25 Feet
500 kV to 750 kV	35 Feet

Important OSHA crane regulation

Cranes and derricks near transmission power lines – OSHA 29 CFR 1926.1407-1411

This regulation applies to power-operated equipment used in construction that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to:

If any part of equipment, load line or load could get closer than 20 feet to less than 350 kV power lines or 50 feet for greater than 350 kV power lines, you must speak with a Duke Energy representative before beginning work.

Such equipment includes, but is not limited to:

- Articulating cranes (such as knuckle boom cranes)
- Floating cranes
- Locomotive cranes
- Multipurpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
- Industrial cranes (such as carry deck cranes)
- Pedestal cranes
- Straddle cranes
- Derricks
- Overhead bridge and gantry cranes NOT permanently installed
- Crawler cranes
- Cranes on barges
- Side boom tractors
- Base-mounted drum hoists only when used with derricks
- Tower cranes
- Portal cranes
- Service/mechanic trucks with a hoisting device
- Dedicated pile drivers
- Mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted and boom truck cranes)
- Variations of these types of equipment



Look up and live.

Working around high-voltage transmission lines



Know how to protect yourself, your crew and the public when working around transmission lines.

Contact us

For more information, please visit duke-energy.com/safety or call:

Duke Energy Carolinas
800.777.9898 or 800.POWERON

Duke Energy Indiana
800.521.2232

Duke Energy Kentucky or Ohio
800.544.6900

Duke Energy Progress
800.452.2777

Duke Energy Florida
800.700.8744

Duke Energy cares about your safety. This brochure contains important information for:

- Anyone working around power lines
- Grading contractors
- Forklift operators
- Crane operators
- Developers (residential, commercial, industrial)
- Architects and engineers
- Dump truck operators

550 South Tryon Street
Charlotte, NC 28202



www.duke-energy.com

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Know your voltage, know your clearance

A planned project is a safe project

Federal law requires that all contractors maintain at least a 10-foot clearance from overhead power lines up to 50 kV. Greater clearance is required for higher-voltage power lines and cranes and derricks in construction.

Contact Duke Energy at least three working days before you start working near overhead power lines and equipment so that safety recommendations can be made.

Treat all transmission lines, regardless of their operating voltage, with caution:

- 44 kV and 100 kV lines look similar.
- Never assume a voltage based on the illustration.
- Minimum clearance includes maximum sag, which must be calculated for each instance.
- Injury or death can occur without touching power lines.
- Assume all overhead power lines are energized.
- Contact Duke Energy if you are in doubt about safe operating distances.

Fact 1.

Power lines that serve your homes and businesses are not insulated like home appliance cords.

Fact 2.

Power lines carry 4,000 to 500,000 volts of electricity that can seriously injure or kill on contact.

Fact 3.

The simplest way to stay safe is to know where your power lines are located and stay away.

Check the job site for hazards and know the location of all overhead power lines and electric equipment, including poles and guy wires.

Consider all overhead lines as energized. Mark the work site boundaries to keep workers, vehicles, tools and equipment a safe distance from electric lines and equipment.

Hold a pre-work safety meeting, pointing out areas where overhead lines and electric equipment are located.

We can help you:

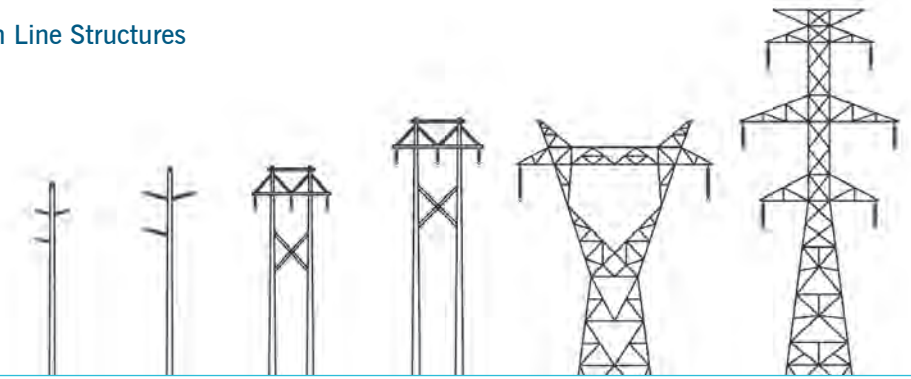
- Confirm voltage
- Confirm clearance
- Confirm wire height under peak conditions
- Provide safety guidance around power lines
- Review and approve drawings for:
 - Compliance with right-of-way restrictions
 - Compliance to National Electric Safety Code
- Identify the best, safe solution

Emergency situations

If your equipment makes contact with an overhead power line, notify Duke Energy immediately and take these precautions:

- Have someone call 911.
- Do not attempt to turn off engines or generators.
- Move equipment away from the line only if it is safe to do so.
- Remain on equipment until utility workers arrive and de-energize the line.
- Warn others to stay away. Those on the ground can be injured or killed if they make contact with the equipment.
- If you must leave the equipment because of fire or other dangers, jump off with your feet together. Never touch the ground and equipment at the same time. Keeping your feet together, shuffle or hop away until you are clear of the area.

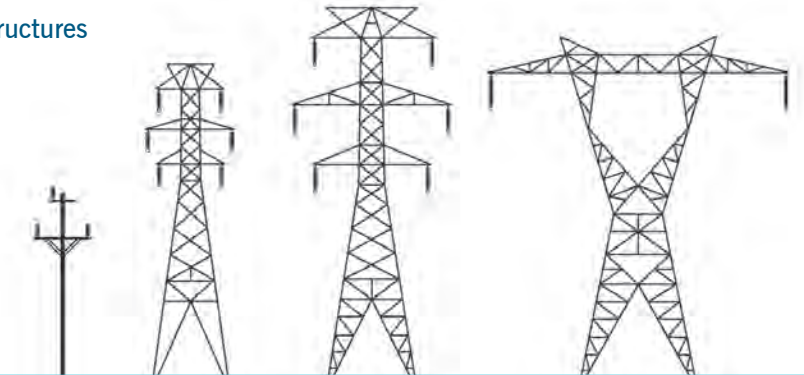
Duke Energy Midwest Transmission Line Structures



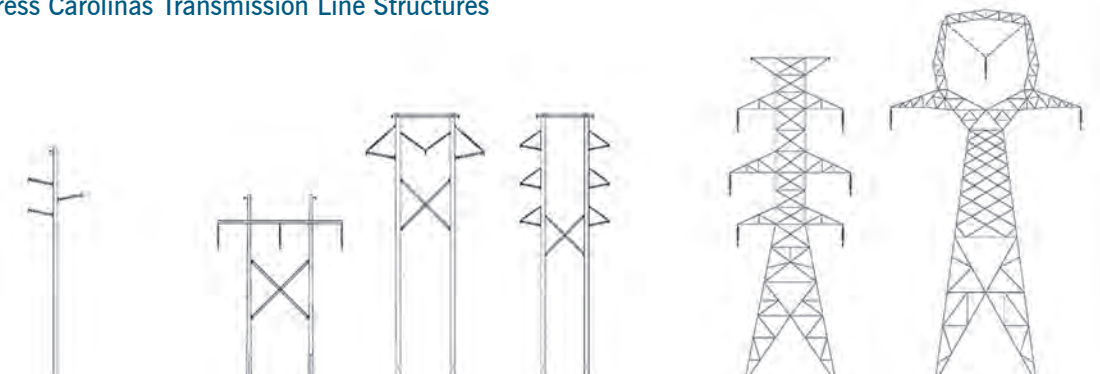
Duke Energy Florida Transmission Line Structures



Duke Energy Carolinas Transmission Line Structures



Duke Energy Progress Carolinas Transmission Line Structures



For more information, visit duke-energy.com/safety.

Duke Energy Extended LONO



Duke Energy
3308 NC Highway 5
Aberdeen, NC 28315
910.944.5249
Lorick.Fanning@duke-energy.com

December 4, 2020 (EXTENDED LONO)

Hazen and Sawyer
Attn: Mr. Jeff Greene – Senior Principle Designer
9101 Southern Pine Blvd., Ste. 250
Charlotte, NC 28273
704-941-6996

Re: LONO EXTENSION FOR 12 MONTHS
Duke Energy Transmission Line Right-of-Way Plan Review Conditional Approval
Project: Union County, NC West Fork Twelve-Mile Creek Interceptor– Duke Energy Easement
Line: Morning Star T – Oakboro TB Goose Creek (2M80) Str. 48-47 | Newport T – Morning Star TB Sandy Ridge (2N51) Str. 54-55 | 270' wide Duke Energy Transmission Easement
Morning Star - Monroe MN Indian Trail (1M1993) Str. 130-132.5 | 68' wide Duke Energy Transmission Easement

Dear Jeff,

This office has reviewed the proposed UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR site plans (attached separately via email) and referred to herein as Attachment "A". We find the plans as shown on the referenced drawings to be acceptable and in compliance with the attached transmission right-of-way guidelines and restrictions. Therefore Duke Energy Transmission ("DET") approves the referenced plans, insofar as its transmission easement rights are concerned, subject to the conditions detailed below. If this project construction has not commenced by a period of 12 months from the date of this letter, this approval by DET shall expire, and additional plan review will be required by DET at that time.

In summary, the following details DET's comments:

- No stockpiling or storage of materials, dirt, or equipment of any kind is permitted within the DET easement area, nor may any combustible materials be placed within the easement area.
- Contractors operating any and all equipment should be instructed not to operate within 25' of the poles, towers, or other electrical structures including guy anchors. All slopes shall be 4:1 or less. No spoil dirt is to be placed within the rights-of-way limits unless previously approved by DET.
- Any proposed easements must not cross closer than 25' to DET's electrical structures including, but not limited to poles, towers, and guy anchors.
- All underground facilities, such as, but not limited to, storm water pipes and domestic water line pipes, must be capable of a heavy equipment load bearing weight of 80,000 lbs. DET will not be responsible for damages to these installed facilities.
- Any damage to the transmission line or its associated structures, related to this project, and/or claims due to the damage, is the responsibility of the developer/owner.
- We have not reviewed, and therefore have not approved, any plans other than Attachment A. DET restrictions prohibit trees that exceed 15' at maturity or lights that exceed 15' within the rights-of-way limits, and neither may be within the wire zone. Vegetation that exceeds 15' in height is subject to removal by DET. Additionally, irrigation systems and signs are not permitted.
- This approval by DET is subject to the paramount right of DET at all times to make use of its entire easement area for the construction, maintenance, reconstruction, and operation of electric lines.

- This letter only addresses issues related to DET's transmission line easement. Additional easements, approvals, or permits from the underlying property owner(s) or other applicable agencies may be required in order for you to proceed with this project .

DET also offers these additional comments to ensure that other potential conflicts are not created during or after construction:

- If there are design changes to any drawings that involve the transmission right-of-way, DET requires a review of the changes for compliance with the rights-of-way guidelines.
- Proper clearances must be maintained at all times. If any transmission line modification by DET is required to maintain proper clearances, the cost will be the responsibility of the developer/owner. Any such line modifications must be approved and scheduled, through DET well in advance of the project start date.
- All current and future property owners are required to adhere to the most current version of the DET transmission right-of-way guidelines and restrictions. (attached separately via email)
- DET heavy equipment access must not be restricted during construction of this project due to grading or any other activity.
- Please contact me prior to the start of this project to attend any pre-construction meetings.

In not objecting to the use of the rights-of-way for use as shown on the drawings, DET is not relinquishing the right to control and maintain the rights-of-way as specified in the recorded easement documents. Any damages to the transmission lines or its associated structures, and claims caused by the damage, is the responsibility of the developer/contractor/owner. It is the responsibility of the developer/contractor/owner to ensure that all work performed in the proximity of the transmission lines complies with all applicable laws and regulations, including but not limited to the National Electric Safety Code ("**NESC**"), the Overhead High-Voltage Line Safety Act ("**OHVLSA**"), and the Occupational Safety and Health Act ("**OSHA**"), and that all persons working near the electric power lines are made aware of the inherent safety hazards associated with these lines.

Please note that this approval is based in part on the accuracy of the information you have supplied on the site plans (Attachment A). You are responsible for indicating the correct location of the DET right of way and its associated electrical structures along with the correct width of the DET rights-of-way limits.

Thank you for the opportunity to work with you on this project. If you have any questions, please feel free to contact me at 910-706-1681.

Sincerely,



Lorick Fanning
Asset Protection Specialist
Transmission Right of Way

Attachments: Attachment "A" - Site Plans
Duke Energy UGET
Duke Energy "Look Up & Live" Brochure

Attachment "A"

Referenced Site Plans:

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – GENERAL AND EROSION CONTROL NOTES AND SEQUENCE, JOB# 30831-049, SHEET X3, DATED FEB.,2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 80+00 TO STA 90+00, JOB# 30831-049, SHEET C9, DATED FEB.,2018

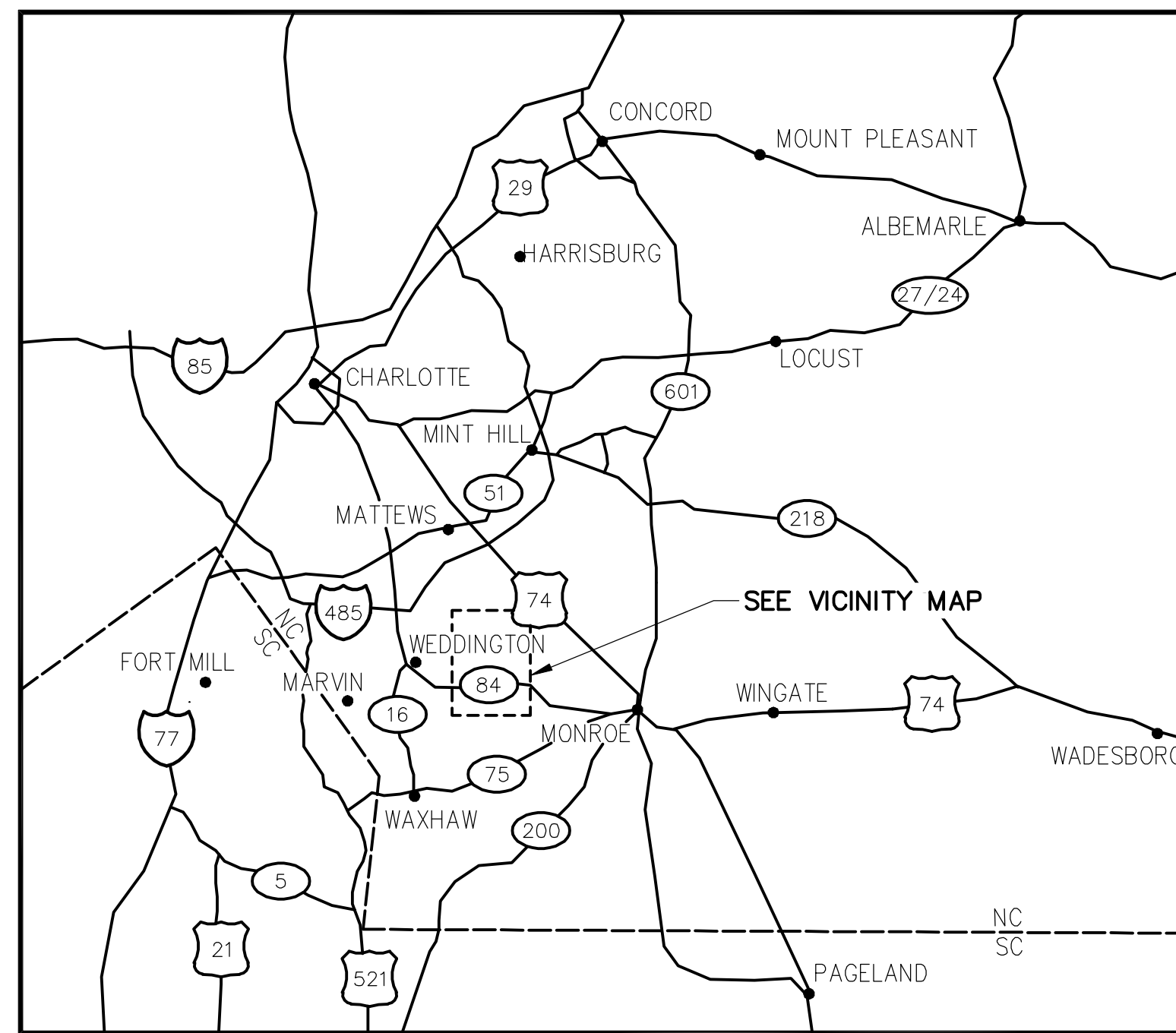
UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 90+00 TO STA 100+00, JOB# 30831-049, SHEET C10, DATED FEB.,2018

UNION COUNTY, NC WEST FORK TWELVE-MILE CREEK INTERCEPTOR – HAZEN & SAWYER – WEST FORK TWELVE-MILE CREEK INTERCEPTOR STA 120+00 TO STA 130+00, JOB# 30831-049, SHEET C13, DATED FEB.,2018

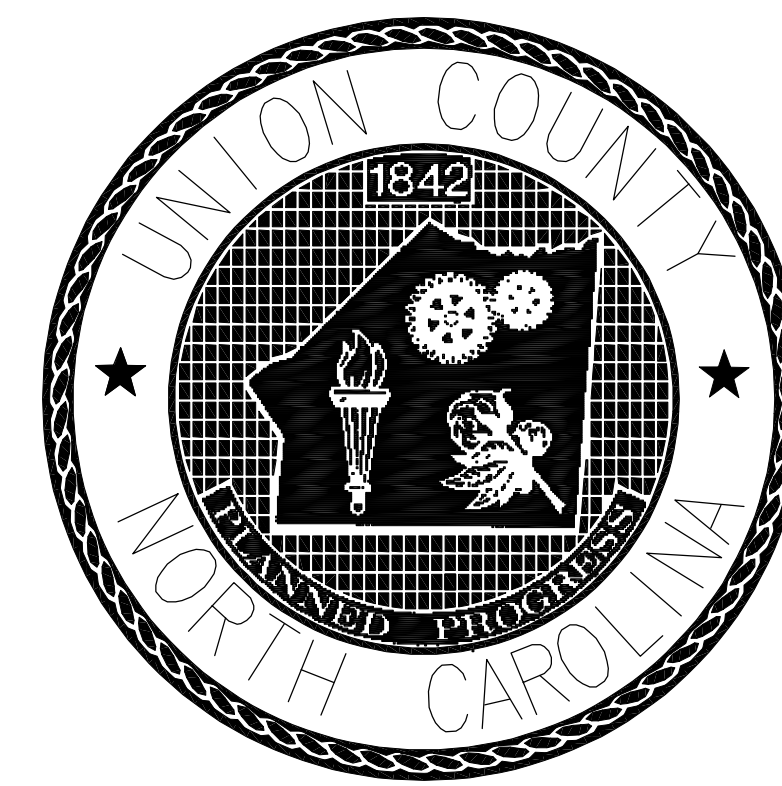
PUBLIC WORKS DEPARTMENT
UNION COUNTY, NORTH CAROLINA

WEST FORK TWELVE-MILE CREEK
INTERCEPTOR

UCPW PROJECT NO. SW037



LOCATION MAP
SCALE : N.T.S.

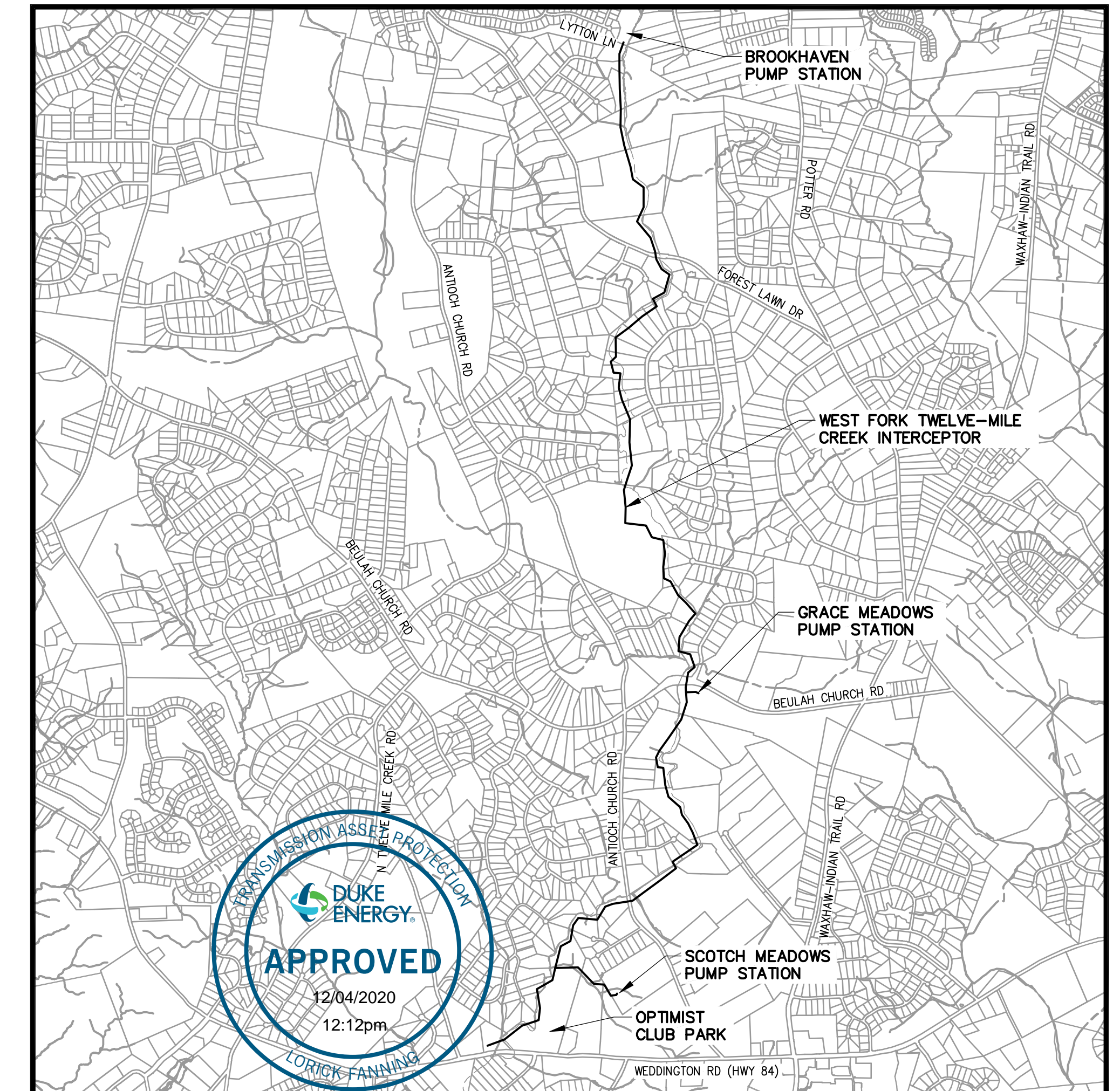


MAY 2018

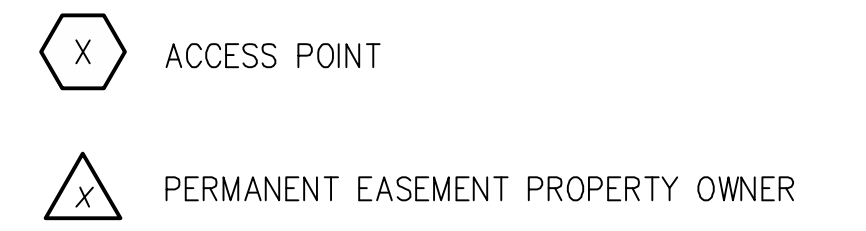
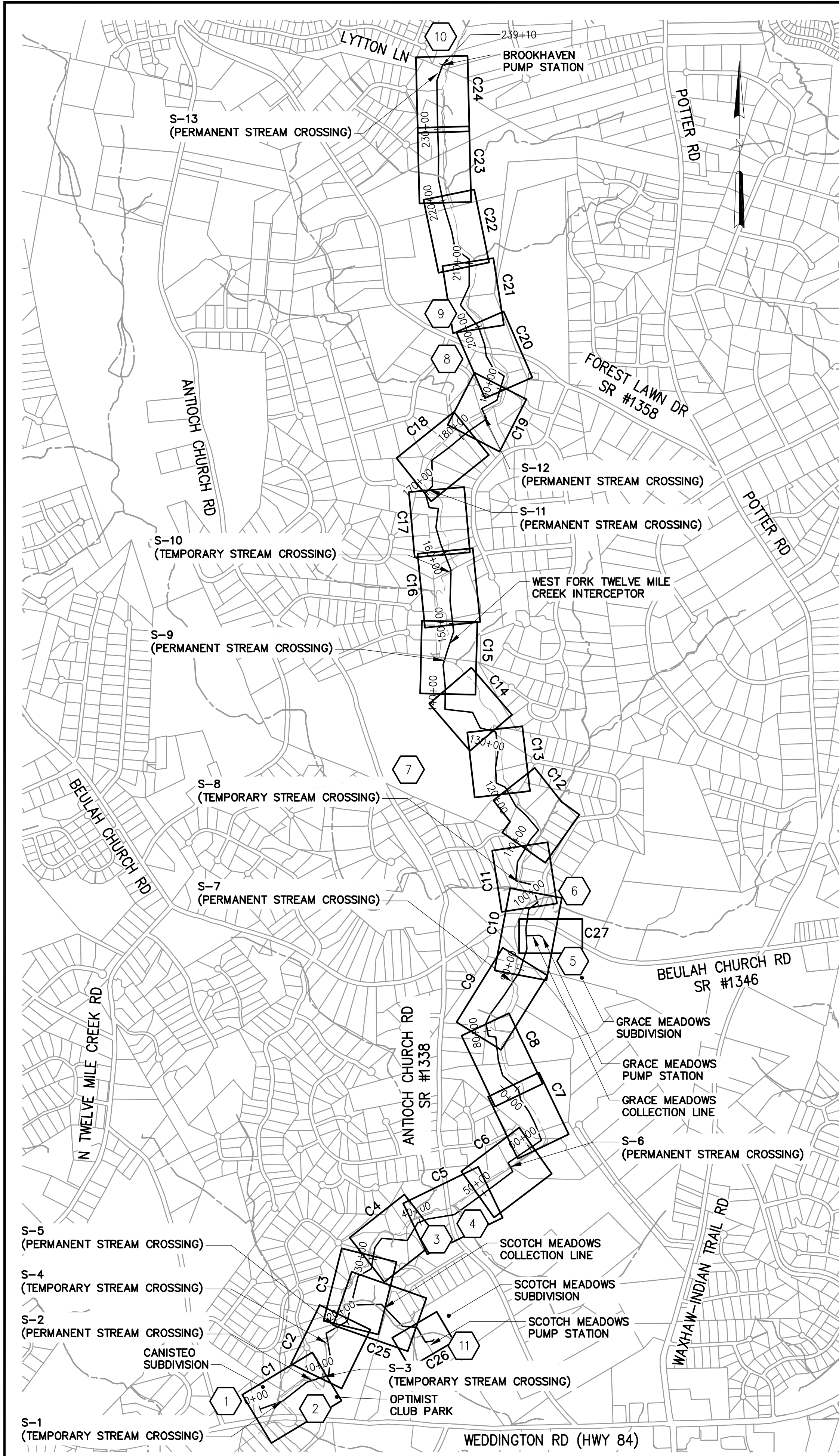


Hazen

HAZEN AND SAWYER
9101 SOUTHERN PINE BLVD, SUITE 250
CHARLOTTE, NORTH CAROLINA 28273
LICENSE NO. : C-0381



VICINITY MAP
SCALE : N.T.S.



R/W #	PID	OWNER(S)	LOCATION ADDRESS	MAILING ADDRESS	CITY	STATE	ZIP CODE	DB & PG
1	06072003E	DEAL ROAD VENTURES LLC (R-DEAN HARRILL)	5800 DEAL ROAD	5645 POTTER RD	MATTHEWS	NC	28104	DB 6909 PG 006
2	609242	WESLEY CHAPEL WEDDINGTON ATHLETIC ASSOCIATION	HWY 84	PO BOX 79252	CHARLOTTE	NC	28271	DB 1648 PG 084
3	6069147	PAUL SCHNEIDER	4049 WHISPERWOOD CT	4049 WHISPERWOOD CT	MATTHEWS	NC	28104	
4	6069146	PAUL SCHNEIDER & WIFE DEBORAH R SCHNEIDER	WHISPERWOOD CT	4049 WHISPERWOOD CT	MATTHEWS	NC	28104	DB 1299 PG 060
5	6069145	MICHAEL L PARHAM & LEAH ERIN MOSS-PARHAM	4033 WHISPERWOOD CT	4033 WHISPERWOOD CT	MATTHEWS	NC	28104	DB 4882 PG 681
6	6069236	WILLIAM E HARVEY & WF SUSAN	2027 MEADOW RUN DR	2027 MEADOW RUN DR	MATTHEWS	NC	28104	
7	6069210	JAMES P SCANLON & MARIN SCANLON	2056 MEADOW RUN DR	2056 MEADOW RUN DR	MATTHEWS	NC	28104	DB 6873 PG 378
8	6069237	ENDO JEZEK & GENEVIEVE JEZEK	2028 MEADOW RD DR	2028 MEADOW RD DR	MATTHEWS	NC	28104	DB 6806 PG 703
9	06069237A	A WAYNE GRIFFIN & WIFE ANNA H GRIFFIN	ANTIOCH CHURCH RD	7000 HIGH MEADOW DR	MATTHEWS	NC	28104	DB 0880 PG 054
10	06069009C	PETER J COUCHELL (COUCHELL INVESTMENT COMPANY)	ANTIOCH CHURCH RD	3362 SMITH FARM RD	MATTHEWS	NC	28104	DB 3102 PG 362
11	06069006	PETER J COUCHELL	ANTIOCH CHURCH RD	3363 SMITH FARM RD	MATTHEWS	NC	28104	DB 1803 PG 160
12	06069006A	PETER J COUCHELL AND FAYE P COUCHELL	3362 SMITH FARM RD	5724 WAXHAW INDIAN TRAIL RD	MATTHEWS	NC	28104	
13	6069273	HUNTER TABONY & CIERRA TABONY	106 ANTIOCH PLANTATION DR	106 ANTIOCH PLANTATION DR	MATTHEWS	NC	28105	DB 6008 PG 244
14	6069272	STEPHANIE Y JOHNSON	108 ANTIOCH PLANTATION RD	108 ANTIOCH PLANTATION RD	MATTHEWS	NC	28104	DB 5506 PG 757
15	6069271	JACKIE L ISHAM & WIFE EVELYN C	110 ANTIOCH PLANTATION DR	110 ANTIOCH PLANTATION DR	MATTHEWS	NC	28104	DB 1491 PG 064
16	06069006D	PETER J COUCHELL & FAYE P	WAXHAW INDIAN TRAIL RD	3362 SMITH FARM RD	MATTHEWS	NC	28104	
17	06069003C	FRANK C OSBORNE	4816 ANTIOCH CHURCH RD	4816 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 4322 PG 287
18	06069003A	FLOYD C OSBORNE & WIFE SUSAN M OSBORNE	4724 ANTIOCH CHURCH RD	4724 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 1017 PG 770
19	06069003K	ANTHONY G BUTLER & KAROLYN J	WAXHAW INDIAN TRAIL RD	230 CHAUCER LN	MATTHEWS	NC	28104	DB 4605 PG 001
20	6042001	BEL AIR ACQUISITION SUB LLC	4994 WAXHAW INDIAN TRAIL RD	8601 N SCOTTSDALE RD STE 225	SCOTTSDALE	AZ	85253	DB 6480 PG 048
21	6066076	COBBLECREEK DRIVE HOMEOWNERS ASSOCI	COBBLE CREEK DR	7324 COBBLECREEK DR	MATTHEWS	NC	28104	DB 0947 PG 050
22	6066260	MICHAEL M KAYES & RANDI OWSELY KAYES	240 PEBBLESTONE LN	240 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 6674 PG 711
23	6066261	DAVID A DRUMMOND & WIFE NANCY B	248 PEBBLESTONE LN	248 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 1512 PG 803
24	6066262	GERALD A WEBER JR & WIFE KELLY L	256 PEBBLESTONE LN	256 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 1335 PG 398
25	6066057	JEFFREY K CALLAHAN & WENDY D CALLAHAN	7331 COBBLE CREEK DR	7331 COBBLE CREEK DR	MATTHEWS	NC	28104	DB 6123 PG 544
26	6066056	MIKEY L WALLS & WIFE CYNTHIA	7335 COBBLE CREEK DR	7335 COBBLE CREEK DR	MATTHEWS	NC	28104	DB 6887 PG 0766
27	6066053	EARL DEBERRY JR & WIFE CONNIE	7351 COBBLE CREEK DR	7351 COBBLECREEK DR	MATTHEWS	NC	28105	
28	6066052	DANIEL WRIGHT & LAUREN WRIGHT	7354 COBBLE CREEK DR	7354 COBBLE CREEK DR	WEDDINGTON	NC	28104	DB 6475 PG 747
29	6066051	STEVE H PHIFER	7352 COBBLE CREEK DR	7352 COBBLECREEK DR	MATTHEWS	NC	28105	DB 1085 PG 710
30	6066002	PCM HOLDINGS LLC	ANTIOCH CHURCH RD	188 N TRADE ST	MATTHEWS	NC	28105	DB 5881 PG 498
31	6066003	PHILLIP L COHN & WIFE BARBARA B	7240 FOREST RIDGE DR	7240 FOREST RIDGE DR	MATTHEWS	NC	28104	
32	6066187	RICHARD L COBB & VIRGINIA	FOREST RIDGE DR	7200 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 5156 PG 852
33	6066186	JEFFERY S TERRY & WIFE NICOLE C	7166 FOREST RIDGE DR	7166 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 1171 PG 177
34	6066185	DONALD SMITH & WIFE LINDA SMITH	7162 FOREST RIDGE DR	7162 FOREST RIDGE DR	MATTHEWS	NC	28105	DB 1005 PG 306
35	6066184	REBECCA V SHERIDAN	7158 FOREST RIDGE DR	7158 FOREST RIDGE DR	MATTHEWS	NC	28105	DB 1180 PG 127
36	6066183	KATHERINE J BANKS	7154 FOREST RIDGE DR	7154 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 4375 PG 787
37	6066181	RICHARD D SIMMONS & WF PHYLLIS I	7150 FOREST RIDGE DR	7150 FOREST RIDGE DR	MATTHEWS	NC	28105	
38	6066180	THOMAS E GAYE & WIFE LINDA J	7146 FOREST RIDGE DR	7146 FOREST RIDGE DR	MATTHEWS	NC	28105	
39	6066179	DAVID W CLOUD & WIFE CAROLYN V	7138 FOREST RIDGE DR	7138 FOREST RIDGE DR	MATTHEWS	NC	28104	
40	6066178	JAMES A LLOYD & WF JENNY D	7134 FOREST RIDGE DR	7134 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 1983 PG 209
41	6066177	ALAN J CAMHI & LYNDA A SCORDO	7130 FOREST RIDGE DR	7130 FOREST RIDGE DR	MATTHEWS	NC	28104	DB 4765 PG 225
42	6066176	VADIM MOSHKOVSKY & YELENA MOCHKOVSKY	7126 FOREST RIDGE DR	7126 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 5548 PG 192
43	6066175	JEAN DANIEL CAUSSE & DIONNE R CAUSSE	7122 FOREST RIDGE DR	7122 FOREST RIDGE DR	WEDDINGTON	NC	28104	DB 6572 PG 611
44	6066174	PETER M ROLFE & WF ANNET T	7118 FOREST RIDGE DR	7118 FOREST RIDGE DR	MATTHEWS	NC	28104	
45	06063039A	VERONICA THOMAS HELMS	CEDAR BEND	3516 CEDAR BEND	MATTHEWS	NC	28104	DB 6494 PG 342
46	6063038	RICHARD GERALD KELLER III & JESSECA NICHOLE KELLER	3514 FOREST LAWN DR	3514 FOREST LAWN DR	WEDDINGTON	NC	28104	DB 5938 PG 756
47	06063001A	J & J PARTNERS LIMITED PARTNERSHIP (FOREST LAWN)	SR 1358	3700 FOREST LAWN DR	MATTHEWS	NC	28104	
48	7150017	J & J PARTNERS LIMITED PARTNERSHIP (FOREST LAWN)	FOREST LAWN DR	3700 FOREST LAWN DR	MATTHEWS	NC	28104	
49	7150015	BRENDA P HELMS & RICHARD WAYNE HELMS	3009 FOREST LAWN DR	3009 FOREST LAWN DR	MATTHEWS	NC	28104	
50	07150014A	GREYLYN HOMEOWNERS ASSOCIATION INC	GREYLYN DR	1248 GREYLYN DR	WEDDINGTON	NC	28104	
51	7150101	JEFFREY A LANDON & WIFE VICTORIA L	1248 GREYLYN DR	1248 GREYLYN DR	WEDDINGTON	NC	28104	DB 1229 PG 135
52	7150102	THOMAS E VAN SISTINE & WIFE MARY	1251 GREYLYN DR	1251 GREYLYN DR	MATTHEWS	NC	28104	DB 1044 PG 333
53	06069021A	WEDDINGTON OPTIMIST CLUB OF WAXHAW	HWY 84	P O BOX 522	WAXHAW	NC	28173	
54	06069022A	SOUTHBROOK COMMUNITY CHURCH (ATTN: GARY HADJIC)	5607 HWY 84	5607 MONROE WEDDINGTON RD	MATTHEWS	NC	28104	DB 0950 PG 049
55	6066263	TERRY L JARVIE AND WIFE SHERRI M JARVIE	239 PEBBLESTONE LN	239 PEBBLESTONE LN	MATTHEWS	NC	28104	DB 0959 PG 109
56	6069003E	FLOYD C OSBORNE & WIFE SUSAN M OSBORNE	4724 ANTIOCH CHURCH RD	4724 ANTIOCH CHURCH RD	MATTHEWS	NC	28104	DB 1204 PG 200

DRAWING NO. DESCRIPTION
GENERAL

CVR COVER
X1 SHEET LAYOUT AND INDEX OF DRAWINGS
X2 LEGEND AND ABBREVIATIONS
X3 GENERAL AND EROSION CONTROL NOTES AND SEQUENCE
X4 ACCESS ROUTE 7

PLAN AND PROFILE
WEST FORK TWELVE-MILE CREEK INTERCEPTOR

C1 STA 0+00 TO STA 10+00
C2 STA 10+00 TO STA 20+00
C3 STA 20+00 TO STA 30+00
C4 STA 30+00 TO STA 40+00
C5 STA 40+00 TO STA 50+00
C6 STA 50+00 TO STA 60+00
C7 STA 60+00 TO STA 70+00
C8 STA 70+00 TO STA 80+00
C9 STA 80+00 TO STA 91+00
C10 STA 90+00 TO STA 100+00
C11 STA 100+00 TO STA 110+00
C12 STA 110+00 TO STA 120+00
C13 STA 120+00 TO STA 130+00
C14 STA 130+00 TO STA 140+00
C15 STA 140+00 TO STA 150+00
C16 STA 150+00 TO STA 160+00
C17 STA 160+00 TO STA 170+00
C18 STA 170+00 TO STA 181+00
C19 STA 181+00 TO STA 190+00
C20 STA 190+00 TO STA 200+00
C21 STA 200+00 TO STA 210+00
C22 STA 210+00 TO STA 220+00
C23 STA 220+00 TO STA 230+00
C24 STA 230+00 TO STA 239+10

SEWER TO SERVE SCOTCH MEADOWS

C25 STA 0+00 TO STA 10+00
C26 STA 10+00 TO STA 13+97

SEWER TO SERVE GRACE MEADOWS

C27 STA 0+00 TO STA 2+37

DEMOLITION PLANS

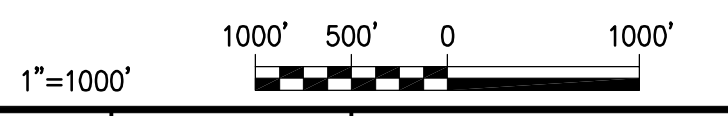
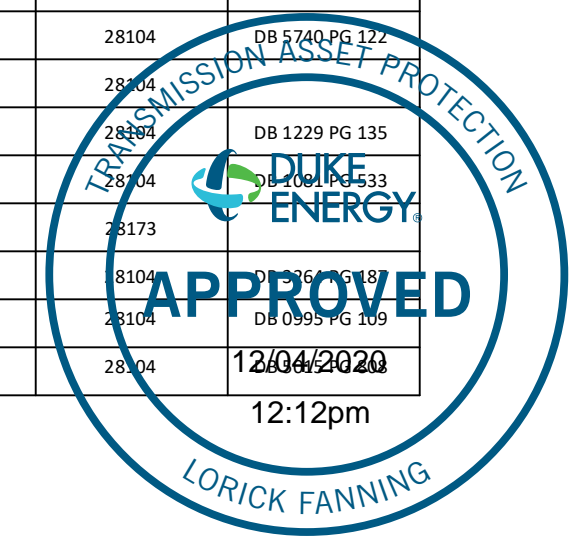
C28 SCOTCH MEADOWS PUMP STATION
C29 GRACE MEADOWS PUMP STATION
C30 BROOKHAVEN PUMP STATION

STANDARD DETAILS

D1 MISCELLANEOUS STANDARD DETAILS
D2 MISCELLANEOUS STANDARD DETAILS
D3 MISCELLANEOUS STANDARD DETAILS
D4 MISCELLANEOUS STANDARD DETAILS
D5 UNION COUNTY PUBLIC WORKS STANDARD DETAILS
D6 UNION COUNTY PUBLIC WORKS STANDARD DETAILS

REFERENCE DRAWINGS

R1-R9 REFERENCE DRAWING



DESIGNED	JOG
DRAWN	GWJ
CHECKED	XXX
PROJ. ENGR.	JNS
APPROVED	



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NORTH CAROLINA**

**WEST FORK TWELVE-MILE CREEK
INTERCEPTOR**

SHEET LAYOUT AND INDEX OF DRAWINGS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE MAY 2018
H & S JOB NUMBER **30831-049**
CONTRACT NUMBER
DRAWING NUMBER **X1**

ABBREVIATIONS

APPROX ASPH	APPROXIMATE ASPHALT	JB	JUNCTION BOX
BLDG BOC	BUILDING BACK OF CURB	LAT	LATERAL
		LAV	LAVATORY
		LB	POUND/LINE BACK
		LF	LINEAR FEET
		LP	LIGHT POLE
		LOC	LIMITS OF CONSTRUCTION
CB	CATCH BASIN	MH	MANHOLE
CE	CONSTRUCTION EASEMENT	MIN	MINIMUM
CI	CAST IRON/CUBIC INCHES	MISC	MISCELLANEOUS
CIP	CAST IRON PIPE		
CL	CENTER LINE	N	NORTH
CLF	CHAIN LINK FENCE	NTS	NOT TO SCALE
CMP	CORRUGATED METAL PIPE		
CMU	CONCRETE MASONRY UNIT	R	PROPERTY LINE/PLATE
CO	CLEANOUT	PP	POWER POLE
CONC	CONCRETE	PVMT	PAVEMENT
CONST	CONSTRUCTION		
CONT	CONTINUOUS	QTY	QUANTITY
CONTR	CONTRACTOR		
DIA	DIAMETER	RCP	REINFORCED CONCRETE PIPE
DIM	DIMENSION	REQD	REQUIRED
DIP	DUCTILE IRON PIPE	REV	REVISE
		RJ	RESTRAINED JOINT
		R/W	RIGHT OF WAY
E	EAST/EASEMENT	S	SOUTH/SLOPE
EA	EACH	SAN	SANITARY
EIP	EXIST IRON PIPE	SCH	SCHEDULE
EL OR ELEV	ELEVATION	SD	STORM/SITE DRAIN
ELEC	ELECTRIC/ELECTRICAL	SEW	SEWER
ENGR	ENGINEER	SF	SQUARE FEET
ENT	ENTRANCE	SHT	SHEET
EOG	EDGE OF GRAVEL	SPEC	SPECIFICATION
EOP	EDGE OF PAVEMENT	SO	SQUARE
EQ	EQUAL	SS	SANITARY SEWER
EX	EXISTING	ST	STREET
		STA	STATION
		STD	STANDARD
F&C	FRAME AND COVER	TEL	TELEPHONE
F&G	FRAME AND GRATE	TYP	TYPICAL
		UG	UNDERGROUND
		UTIL	UTILITY
FH	FIRE HYDRANT	W	WEST/WIDTH
FM	FORCE MAIN	W/	WITH
FT	FEET	WL	WATER LINE
		WV	WATER VALVE
G	GAS/GAS LINE		
GC	GENERAL CONTRACTOR		
GI	GALVANIZED IRON		
GR	GRADE		
GW	GUY WIRE		
H	HEIGHT		
HORZ	HORIZONTAL		
I	IRON		
IN	INCH		
INV	INVERT		

LEGEND

LINETYPES	
	PROPOSED ITEMS
	EXISTING ITEMS
	HIDDEN ITEMS
	FEMA 100YR FLOODPLAIN
	FEMA FLOODWAY
	CENTER LINE
	MATCH LINE
	EASEMENT
	EXIST SANITARY SEWER
	EXIST MANHOLE
	NEW MANHOLE
	FENCE
	BRIDGE
	GUARDRAIL
	CURB & GUTTER
	STREET SIGN
	FIRE HYDRANT
	MAILBOX
	SOIL BORING
	GROUND ELEVATION
	POWER POLE
	POWER POLE W/GUY WIRE
	PLUG
	WATER MAIN
	FIBER OPTIC CABLE
	UNDERGROUND ELECTRIC
	UNDERGROUND COMMUNICATIONS
	GAS MAIN
	OVERHEAD ELECTRIC
	PROPERTY LINE
	RIGHT-OF-WAY
	DITCH, CREEK OR BRANCH
	STORM DRAIN W/CATCH BASIN OR DROP INLET
	STORM DRAIN CULVERT W/ HEADWALLS
	TREE LINE
	WETLANDS
	TEMPORARY CONSTRUCTION EASEMENT
	PERMANENT CONSTRUCTION EASEMENT
	SILT FENCE
	LIGHT POLE
	WATER VALVE
	IRON PIN (LOCATED)
	TREE
	TEMPORARY STREAM CROSSING
	FIBER FILTRATION TUBE (FFT)
	STABILIZED OUTLET FOR SILT FENCE
	PERMANENT STEAM CROSSING
	ACCESS GATE

SECTION AND DETAIL KEYING

DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING METHOD:

(A) A SECTION CUT ON DRAWING A3 IS IDENTIFIED AS FOLLOWS:

SECTION LETTER
DRAWING WHERE SECTION IS SHOWN

(B) THE SECTION SHOWN ON DRAWING A6 IS IDENTIFIED AS FOLLOWS:

SECTION LETTER
DRAWING FROM WHERE SECTION WAS TAKEN

DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT DETAILS ARE IDENTIFIED BY A SQUARE WITH A NUMBER IN THE UPPER HALF.

STANDARD DETAILS ARE REFERENCED BY A UNIQUE SEVEN DIGIT NUMBER AND ARE SHOWN ON THE CONTRACT DRAWINGS BY ONE OF TWO METHODS:

OR:

STANDARD DETAILS ARE COMPILED IN APPROXIMATE NUMERICAL ORDER IN THE BACK OF THE CONTRACT DRAWINGS ON THE D* DRAWINGS.



DESIGNED	JOG
DRAWN	GWF
CHECKED	XXX
PROJ. ENGR.	JNS
NO.	ISSUED FOR
	DATE
	BY
	APPROVED



Hazen

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**UNION COUNTY
NORTH CAROLINA**

**WEST FORK TWELVE-MILE CREEK
INTERCEPTOR**

LEGEND AND ABBREVIATIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	X2

GENERAL AND EROSION CONTROL NOTES:

- A MINIMUM OF 5 WORKING DAYS PRIOR TO THE BEGINNING OF ANY WATER AND/OR SANITARY SEWER WORK, CONTACT THE UNION COUNTY PUBLIC WORKS PROJECT MANAGER, SCOTT HUNEYCUTT, AT 704-296-4211, AND AN INSPECTOR WILL BE PROVIDED FOR WORK OVERSIGHT.
- WHERE SANITARY SEWERS AND WATER LINES ARE ENCOUNTERED, THE CONTRACTOR SHALL USE CARE IN WORKING AROUND OR NEAR THEM. IF AN EXISTING SEWER OR WATER LINE IS DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY REPORT THE PROBLEM TO UNION COUNTY PUBLIC WORKS AND REPLACE THE SEWER OR WATER LINE WITH CLASS 350 DUCTILE IRON PIPE. THE CONTRACTOR SHALL REPLACE A MINIMUM OF 18 FEET OF SANITARY SEWER AND/OR WATER LINE WITH CLASS 350 DUCTILE IRON PIPE WHEN ANY OF THE MINIMUM SEPARATION DISTANCES OUTLINED IN THE SPECIAL PROVISIONS FOR THIS PROJECT ARE NOT MET.
- WATER AND SEWER MAINS ARE TO REMAIN ACTIVE DURING CONSTRUCTION. IF THIS IS NOT POSSIBLE, THE CONTRACTOR SHALL FOLLOW UNION COUNTY PUBLIC WORKS PROCEDURES AS OUTLINED IN THE DESIGN MANUAL AND SPECIAL PROVISIONS REGARDING OUTAGES, TEMPORARY WATER SERVICE AND BYPASS SEWER PUMPING. SOME WATER, SEWER, AND GAS MAINS WERE VACUUM EXCAVATED TO DETERMINE APPROXIMATE DEPTH. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL CROSSING UTILITIES WELL IN ADVANCE OF HIS WORK.
- ALL WORK SHALL COMPLY WITH CONTRACT DOCUMENTS AND THE SPECIAL PROVISIONS AS DESCRIBED IN THE CONTRACT DOCUMENTS.
- CONTRACTOR SHALL CONTACT THE LOCAL PUBLIC UTILITIES LOCATING SERVICE TO LOCATE UTILITIES IN THE AREA PRIOR TO ANY EXCAVATION. ALL EXISTING UTILITIES MAY NOT BE SHOWN ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES, WHETHER SHOWN OR NOT, AND REPAIRING ALL DAMAGE TO UTILITIES AT HIS OWN EXPENSE. CONTACT NC ONE CALL AT 811 OR 800-632-4949.
- THE TOPOGRAPHIC MAPS WERE PREPARED FROM AN AERIAL SURVEY -CONTOUR INTERVAL OF 1 FOOT. GRID SYSTEM AND COORDINATES ARE NC STATE PLANE COORDINATE SYSTEM (1983 DATUM).
- CONTRACTOR IS RESPONSIBLE FOR PROCURING ALL REQUIRED PERMITS, MOBILIZATION, STORAGE, AND STAGING AREAS AS WELL AS ACCESS TO ANY CONSTRUCTION SITES WITHIN TEMPORARY AND PERMANENT UNION COUNTY PUBLIC WORKS RIGHT-OF-WAY NOT ALREADY ACQUIRED. EROSION CONTROL DEVICES SHALL BE INSTALLED AND MAINTAINED AT ALL WORK SITES, STAGING AREAS, AND OFF SITE SPOIL AREAS. CONTRACTOR SHALL FOLLOW ALL LOCAL REGULATIONS REGARDING THE WORK, INCLUDING KEEPING MUD AND DIRT OFF OF PRIVATE ENTRANCES, AND REHABILITATING STAGING, STORAGE OR STOCKPILING AREAS TO EQUAL OR BETTER THAN EXISTING CONDITION. CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO PREVENT TRACKING MUD/SOIL ON ADJACENT ROADWAYS. ANY MUD/SOIL TRACKED ON ROADWAYS SHALL BE CLEANED DAILY. CONTRACTOR IS RESPONSIBLE FOR PROCURING ALL PERMITS FOR THESE ADDITIONAL AREAS.
- EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CLEARING OR PERFORMING EXCAVATION IN ANY AREA. EROSION CONTROL FACILITIES SHALL BE MAINTAINED DURING WORK AND SHALL BE REMOVED WHEN WORK IS COMPLETED AND ENGINEER AUTHORIZES REMOVAL. TEMPORARY SEEDING AND MULCHING SHALL BE PERFORMED AS SPECIFIED IN SECTION 02276 - EROSION AND SEDIMENTATION CONTROL.
- CONTRACTOR SHALL NOTIFY MONROE ENERGY SERVICES OR PIEDMONT NATURAL GAS AT LEAST 48 HOURS PRIOR TO ENCRACHING ON OR CROSSING ANY GAS PIPELINE. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS WITH THE VARIOUS UTILITIES TO PROTECT THE GAS PIPELINES AND THE PUBLIC.
- SOIL EXPLORATION WORK WAS PERFORMED BY S&ME. SOILS EXPLORATION WORK IS SOLELY TO ASSIST BIDDERS IN ASSESSING THE NATURE AND EXTENT OF TESTING PROCEDURES REQUIRED TO MAKE THEIR OWN DETERMINATION OF ACTUAL SUBSURFACE CONDITIONS THAT WILL BE ENCOUNTERED DURING THE COURSE OF THE WORK. NO REPRESENTATION IS MADE OR WILL BE GIVEN BY THE ENGINEER CONCERNING ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED. ALL BIDDERS ARE DIRECTED PRIOR TO BIDDING TO CONDUCT ALL INVESTIGATIONS AND TESTING THEY DEEM NECESSARY TO ARRIVE AT THEIR OWN CONCLUSIONS REGARDING SUCH CONDITIONS. SOIL BORING PROFILE ELEVATIONS ARE APPROXIMATE.
- ALL AREAS WITH OPEN EXCAVATIONS, OPEN VAULTS OR MANHOLES, OR EQUIPMENT SHALL BE FENCED WITH TEMPORARY SAFETY FENCING AT LEAST 4 FEET HIGH AT END OF EACH WORK DAY.
- WHEN DEWATERING BORE PITS AND TRENCHES, TURBID WATER SHALL BE PUMPED THROUGH A FILTER BAG, PER DETAIL 0227038.
- ANY LAND CORNER, PROPERTY MONUMENTATION, OR BENCHMARK WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED, THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY. ANY CORNER MONUMENT DISTURBED OR DESTROYED SHALL BE RESET BY A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF NC AT THE CONTRACTOR'S EXPENSE. CONTRACTOR TO PROTECT OR REPLACE NCDOT RIGHT-OF-WAY MARKERS OR MONUMENTS PER NCDOT 806.01.
- CONTACT THE OWNER IMMEDIATELY REGARDING ANY CONFLICTS THAT ARISE DURING CONSTRUCTION OF WORK SHOWN ON THE DRAWINGS.
- THE CONTRACTOR SHALL ADHERE TO ALL CONDITIONS AND REQUIREMENTS OF ALL PERMITS THAT HAVE BEEN OBTAINED AND ALL AVAILABLE LOCAL, STATE AND FEDERAL REGULATIONS. SEE CONTRACT SPECIFICATIONS.
- ALL VAULTS AND MANHOLES WITHIN ROAD RIGHT-OF-WAY SHALL BE DESIGNED FOR HS20 LOADING.
- FOR ALL CONNECTIONS TO EXISTING FACILITIES, CONTRACTOR SHALL VERIFY ALL EXISTING PIPELINE ELEVATIONS, LOCATIONS, DIAMETERS, AND MATERIALS PRIOR TO SHOP DRAWING SUBMITTALS, NOTIFYING THE ENGINEER OF ANY CONFLICTS.
- ALL DRIVEWAYS, DRAIN PIPES, AND HEADWALLS DISTURBED SHALL BE RESTORED TO EQUAL OR BETTER THAN EXISTING CONDITION, IN BOTH NEW AND EXISTING RIGHTS-OF-WAY AND WITHIN ANY TEMPORARY EASEMENT AREAS. ANY STRUCTURES OR DRIVEWAYS DISTURBED OUTSIDE THE RIGHT-OF-WAY OR EASEMENT SHALL ALSO BE FULLY RESTORED AT NO COST TO THE OWNER.
- CONTRACTOR SHALL PROTECT ALL DRAIN CULVERTS DURING CONSTRUCTION. MAINTAIN PROTECTION UNTIL DISTURBED AREAS ARE STABILIZED WITH GROUND COVER SUFFICIENT TO RESTRAIN EROSION.
- PROVIDE TEMPORARY DITCH LINING FOR DISTURBED DITCH LINES OR OTHER AREAS OF CONCENTRATED FLOW WHERE SLOPE IS GREATER THAN 2%.
- WHEN EXCAVATED MATERIALS ARE PLACED ON ROADWAY OR PARKING LOT SURFACES, THE CONTRACTOR SHALL PLACE SAND, STONE SCREENINGS, OR GEOTEXTILE ON THE SURFACE PRIOR TO PLACING THE EXCAVATED MATERIALS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING SITE ACCESSIBLE FOR EMERGENCY VEHICLES AT ALL TIMES.
- CONTRACTOR TO EXCAVATE AND DETERMINE ELEVATION OF ALL KNOWN CONFLICTS AT LEAST 1000 FEET AHEAD OF PIPE OR CASING INSTALLATION.
- CLASS B CONCRETE MIX DESIGN SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3600 psi.
- DISTURBANCE SHALL BE LIMITED TO THE TEMPORARY AND PERMANENT RIGHT-OF-WAY, AREAS FOR WHICH ENCRACHMENT AGREEMENTS HAVE BEEN OBTAINED AND STAGING AREAS PROCURED BY THE CONTRACTOR. CONTRACTOR SHALL REMOVE ALL TREES WITHIN THE LIMITS OF THE PERMANENT UNION COUNTY PUBLIC WORKS RIGHT-OF-WAY, EXCEPT WHERE TREE PROTECTION IS SHOWN ON THE DRAWINGS.
- LIMITS OF CONSTRUCTION (LOC) TO BE EDGE OF TEMPORARY CONSTRUCTION EASEMENT (TCE), EDGE OF PAVEMENT (EOP) OR SILT FENCE LINE (OPEN AREAS) AS INDICATED ON INDIVIDUAL DRAWINGS.
- LIMITS OF DISTURBANCE FOR THIS PROJECT IS APPROXIMATELY 12.3 ACRES.
- ALL MANHOLES WITH RIMS LESS THAN OR EQUAL TO 2- FEET ABOVE THE FEMA 100 YEAR BASE FLOOD ELEVATION ARE TO HAVE SEALED RINGS AND COVERS PER DETAIL 9A.
- CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING ALL UTILITY POLES DURING CONSTRUCTION WITHIN PROJECT LIMITS.
- ALL LAWN AREAS SHALL RECEIVE MIN 6" TOPSOIL PRIOR TO SEEDING AND MULCHING.

EROSION CONTROL SEQUENCE:

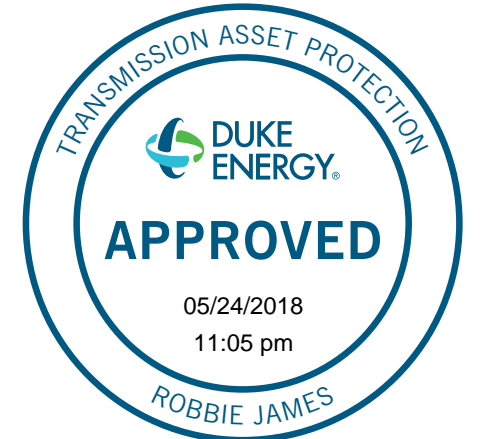
- NO DEMOLITION, CONSTRUCTION OR LAND DISTURBANCE ACTIVITIES MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED IN LOCATIONS AS SHOWN ON THE CONTRACT DRAWINGS. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL OTHER MEASURES SHOWN SHALL BE INSTALLED FIRST. THE CLEARING OF THE LAND NECESSARY FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
- ONCE ALL MEASURES HAVE BEEN INSTALLED, THE SITE SHALL BE CLEARED AND GRUBBED AS NECESSARY WITHIN THE LIMITS OF DISTURBANCE AS SHOWN ON THE CONTRACT DRAWINGS. EFFORTS SHALL BE MADE TO MINIMIZE THE AMOUNT OF CLEARED AREA EXPOSED AT ANY GIVEN TIME.
- ONCE CLEARING AND GRUBBING IS COMPLETE, ANY NECESSARY TOPSOIL STRIPPING MAY BEGIN. TOPSOIL SHALL BE STOCKPILED ON SITE IN THE STOCKPILING AREAS SHOWN ON THE CONTRACT DRAWINGS. STOCKPILE SHALL RECEIVE SUCH TEMPORARY SEEDING MEASURES AS MAY BE REQUIRED. ANY SOIL TAKEN OFFSITE SHALL BE STOCKPILED AT LOCATIONS WITH ALL REQUIRED PERMITS. IF OFFSITE LOCATION DOES NOT HAVE ALL REQUIRED PERMITS, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY REQUIRED PERMITS.
- DEMOLITION, EARTHWORK AND CONSTRUCTION OPERATIONS MAY BEGIN ONCE TOPSOIL HAS BEEN REMOVED AND STOCKPILED.
- EROSION CONTROL DEVICES SHALL BE INSTALLED AND MAINTAINED AT ALL WORK SITES, STAGING AREAS, AND OFF SITE SPOIL AREAS.
- EROSION AND SEDIMENTATION CONTROL FACILITIES SHALL BE INSTALLED PRIOR TO CLEARING OR PERFORMING EXCAVATION IN ANY AREA. EROSION CONTROL FACILITIES SHALL BE MAINTAINED DURING WORK AND SHALL BE REMOVED WHEN WORK IS COMPLETED. SUFFICIENT GROUND COVER IS ESTABLISHED AND ENGINEER AUTHORIZES REMOVAL. TEMPORARY SEEDING AND MULCHING SHALL BE PERFORMED AS SPECIFIED IN SECTION 02276 - EROSION AND SEDIMENTATION CONTROL.
- INLET PROTECTION IS REQUIRED FOR ALL INLETS LOCATED IN THE WORKING AREA AND ADJACENT AREAS AND REQUIRED UNTIL THE SITE IS FULLY STABILIZED.
- PERMANENT AND TEMPORARY STREAM CROSSINGS SHALL BE INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS FOR CONSTRUCTION ACCESS ACROSS STREAMS.
- PIPELINE INSTALLATION THROUGH EXISTING ASPHALT ROADWAYS SHALL UTILIZE PIPE BORING, JACKING, AND OPEN CUT OF ROADWAYS, AS SHOWN ON THE CONTRACT DRAWINGS.
- ALL PIPES SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD CONSTRUCTION TECHNIQUES. ONLY THE LENGTH OF TRENCH IN WHICH PIPE CAN BE INSTALLED IN ONE DAYS TIME SHALL BE OPEN AT ANY TIME, WITH SPOIL MATERIAL PLACED ON THE UPHILL SIDE OF THE TRENCH. PIPING SHALL BE CAPPED AT END OF EACH DAYS WORK TO PREVENT SEDIMENT FROM ENTERING. ALL OPEN CUT PIPELINE TRENCHES SHALL BE BACKFILLED AT END OF WORK WEEK. DISTURBED AREA SHALL BE SEEDDED AND MULCHED WITHIN SEVEN (7) DAYS OF BACKFILL.
- ALL PIPING AROUND EXISTING STRUCTURES SHALL HAVE EXCAVATION SUPPORT DURING INSTALLATION TO MAINTAIN THE INTEGRITY OF THE EXISTING STRUCTURES.
- ONCE CONSTRUCTION ACTIVITIES ARE COMPLETE, FINAL GRADING MAY BEGIN.
- CONSTRUCTION ENTRANCES SHALL REMAIN IN PLACE UNTIL FINAL STABILIZATION HAS BEEN ACHIEVED OR UNTIL ALL MAJOR GRADING ACTIVITIES HAVE CEASED, AND NEW ROADWAYS ARE PAVED. ANY MUD/SOIL TRACKED ON ROADWAYS SHALL BE CLEANED DAILY.
- UPON COMPLETION OF FINAL GRADING, PERMANENT SEEDING, MULCHING AND FERTILIZING MEASURES SHALL BE EMPLOYED ON ALL DISTURBED AREAS AS PER SECTION 02910 - FINAL GRADING AND LANDSCAPING. PERMANENT SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN (7) DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. ALL EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ENTIRE SITE HAS BEEN STABILIZED.
- ONCE PERMANENT STABILIZATION HAS OCCURRED, TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE REMOVED. ANY AREAS DISTURBED BY THE REMOVAL OF THESE MEASURES SHALL BE RETURNED AS CLOSELY AS POSSIBLE TO ORIGINAL CONDITION AND SEEDDED, MULCHED AND FERTILIZED AS PER SPECIFICATION SECTION 02910.
- ADDITIONAL SILT FENCE AND SILT FENCE STONE OUTLETS MAY BE REQUIRED BASED ON FIELD CONDITIONS AS APPROVED BY ENGINEER.

CONSTRUCTION SEQUENCE:

- CONTRACTOR TO HAVE SEDIMENTATION AND EROSION CONTROL MEASURES IN PLACE PRIOR TO ANY LAND DISTURBING ACTIVITY.
- CONTRACTOR TO NOTIFY ALL AFFECTED PROPERTY OWNERS MINIMUM 3 DAYS IN ADVANCE OF WORKING ON THEIR PROPERTY. ACTUAL CONTACT WITH OWNER OR DOOR HANGERS SHOULD BE USED.
- CLEARING WITHIN THE TEMPORARY EASEMENTS (TCE) SHALL BE LIMITED TO CLEARING ONLY WHAT'S ABSOLUTELY NECESSARY FOR CONTRACTOR'S WORK.
- THE CONTRACTOR SHALL KEEP AREA AS CLEAN AND NEAT AS POSSIBLE AT ALL TIMES.
- UPON COMPLETION AND ACCEPTANCE OF PROJECT, CONTRACTOR SHALL REMOVE ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES.
- ONCE CONSTRUCTION ACROSS EACH STREAM/CREEK IS COMPLETED, INSTALL SILT FENCE AND/OR ADDITIONAL MEASURES ADJACENT TO THE STREAM/CREEK UNTIL THE AREA IS STABILIZED.

DUKE ENERGY NOTES:

- NO STOCKPILING OF ANY MATERIALS WITHIN THE DUKE ENERGY TRANSMISSION EASEMENT AT ANY TIME.
- DUKE ENERGY SHALL HAVE FREE AND CLEAR INGRESS/EGRESS TO ITS FACILITIES AT ALL TIMES.
- ALL CROSSING MATERIALS SHALL BE ABLE TO WITHSTAND 80K POUNDS.
- ALL CROSSINGS SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO 95% AT END OF EACH DAY.
- DUKE ENERGY SHALL NOT BE RESPONSIBLE FOR ANY DAMAGE TO CONSTRUCTION MATERIALS WITHIN THE TRANSMISSION EASEMENT.
- ALL EROSION CONTROL DEVICES WITHIN DUKE ENERGY'S TRANSMISSION EASEMENT SHALL BE REMOVED UPON COMPLETION AND ACCEPTANCE OF PROJECT. VEGETATION MUST BE RE-ESTABLISHED IN DUKE ENERGY'S TRANSMISSION EASEMENT IF DAMAGED.
- ALL WORK WITHIN DUKE ENERGY'S TRANSMISSION EASEMENT SHALL COMPLY WITH DUKE'S GUIDELINES AND RESTRICTIONS, CLEARANCES AND OSHA REGULATIONS.



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NO.	ISSUED FOR
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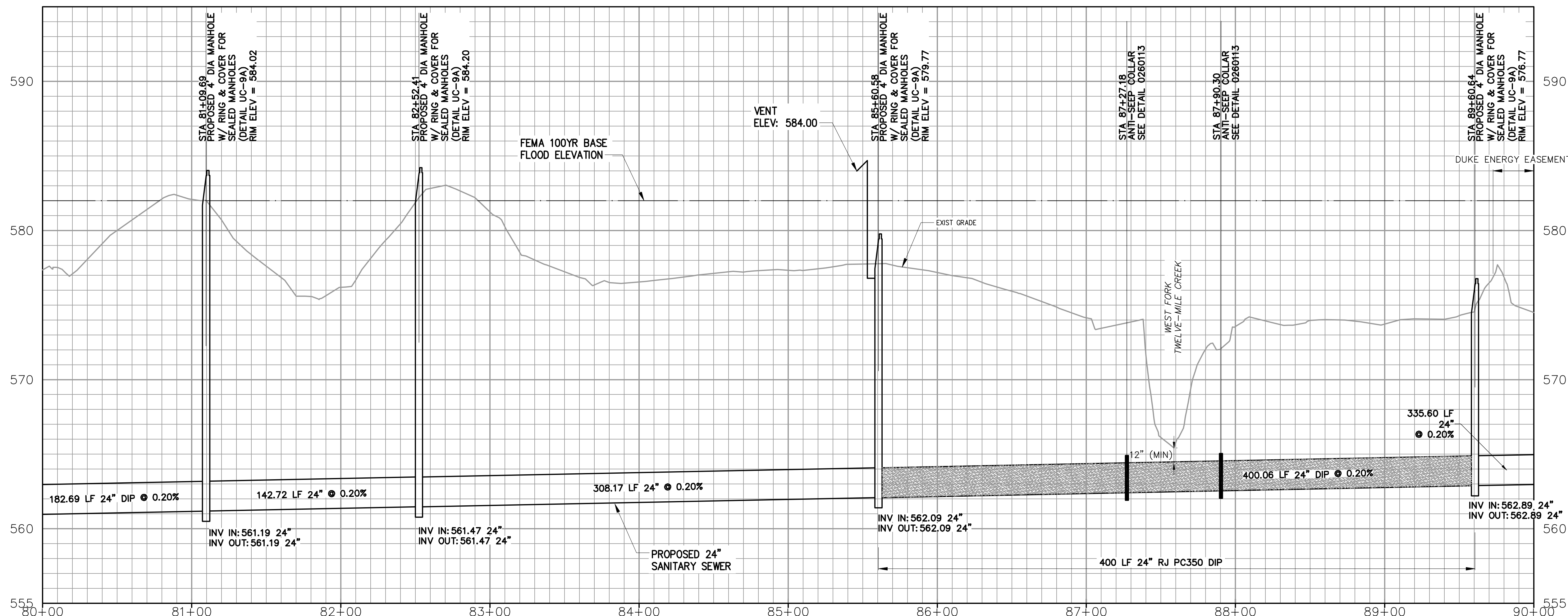
HAZEN AND SAWYER
 9101 SOUTHERN PINE BLVD, SUITE 250
 CHARLOTTE, NORTH CAROLINA 28273
 LICENSE NO. : C-0381

UNION COUNTY
NORTH CAROLINA

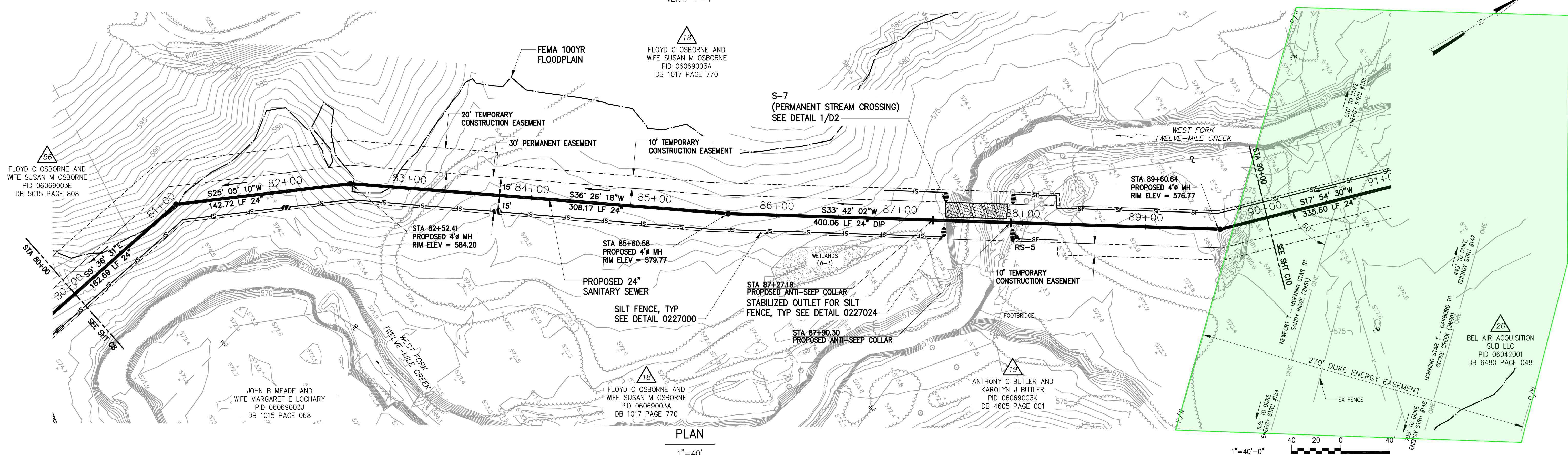
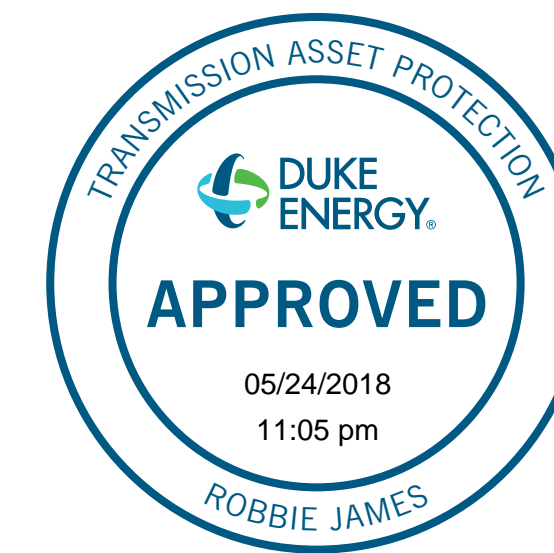
WEST FORK TWELVE-MILE CREEK
INTERCEPTOR

GENERAL AND EROSION CONTROL
NOTES AND SEQUENCE


THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	X3



NOTES:
 1. SEE DUKE ENERGY NOTES ON SHEET X3 FOR WORK WITHIN DUKE ENERGY TRANSMISSION EASEMENT.



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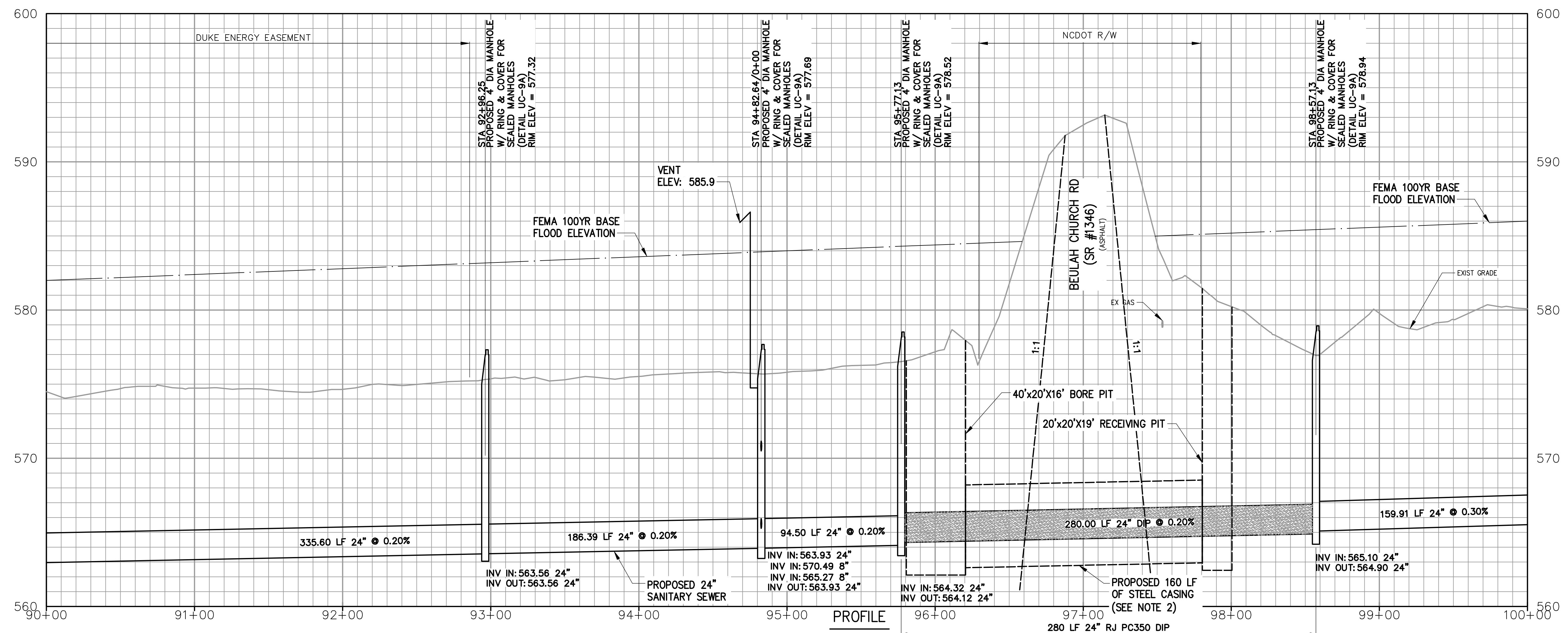

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 HAZEN AND SAWYER
 9101 SOUTHERN PINE BLVD, SUITE 250
 CHARLOTTE, NORTH CAROLINA 28273
 LICENSE NO. : C-0381

UNION COUNTY
NORTH CAROLINA
WEST FORK TWELVE-MILE CREEK
INTERCEPTOR

WEST FORK TWELVE-MILE CREEK
INTERCEPTOR
STA 80+00 TO STA 91+00

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

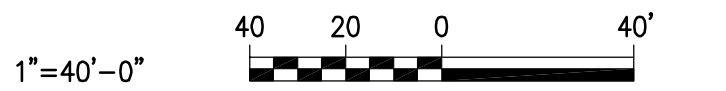
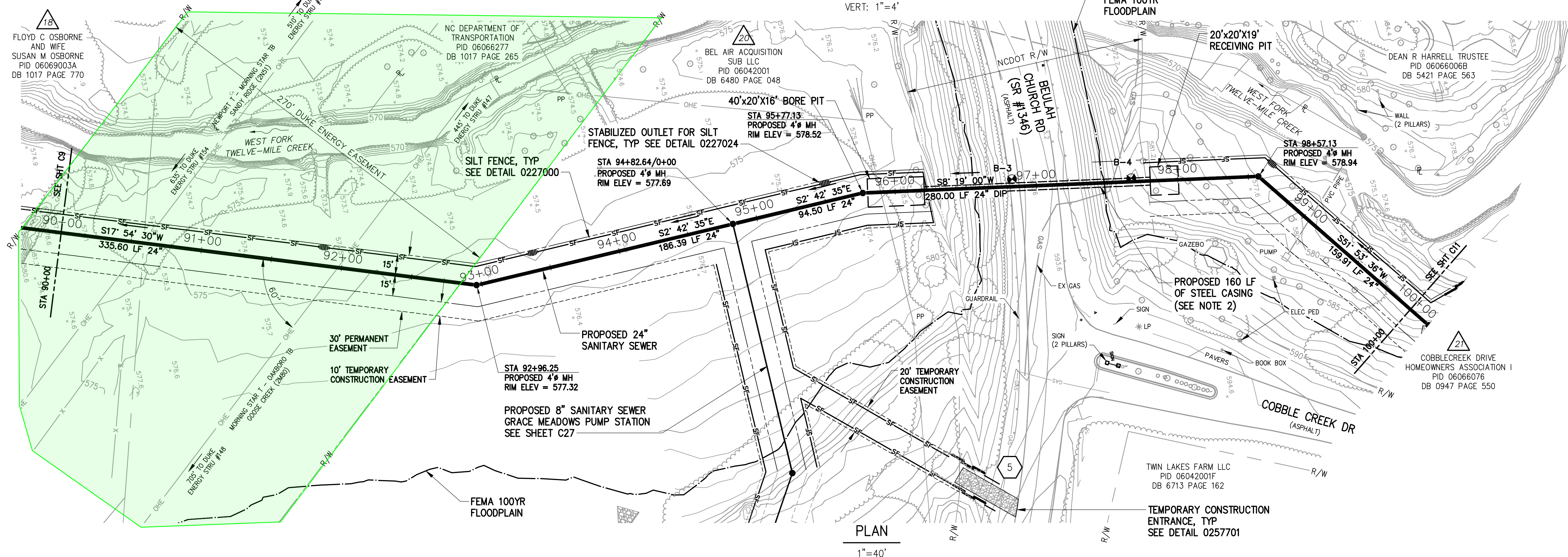
DATE	MAY 2018
H & S JOB NUMBER	30831-049
CONTRACT NUMBER	
DRAWING NUMBER	C9



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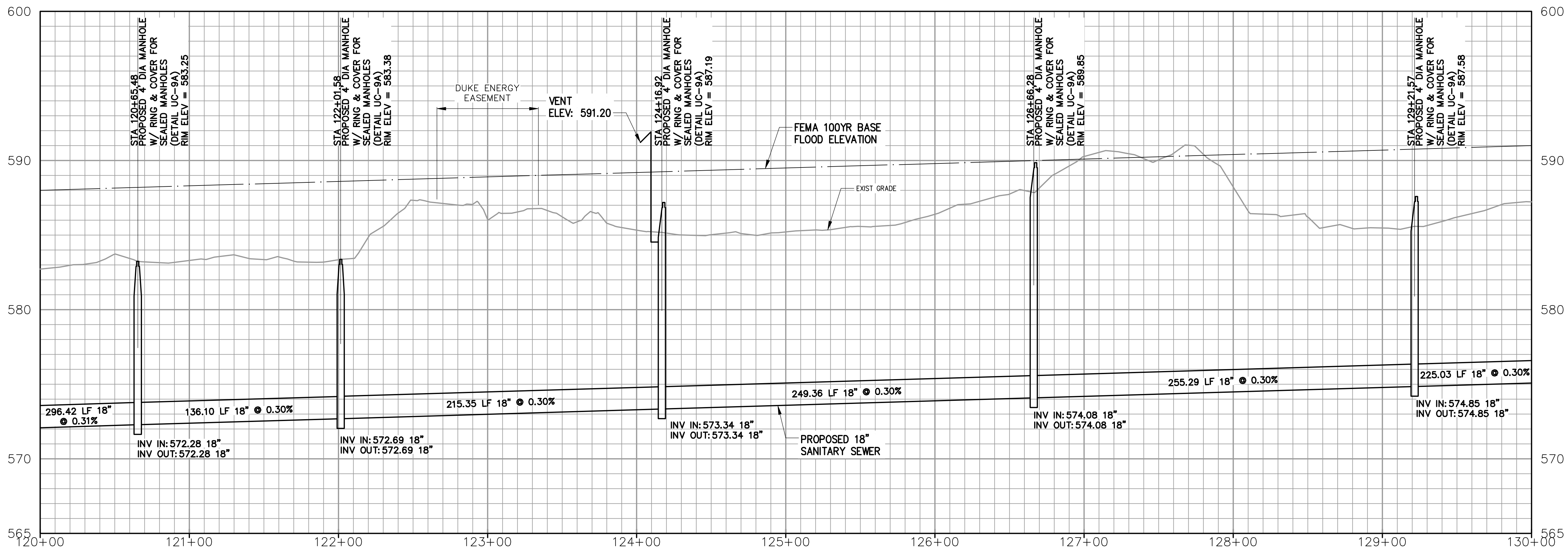
- SEE DUKE ENERGY NOTES ON SHEET X3 FOR WORK WITHIN DUKE ENERGY TRANSMISSION EASEMENT.
- CONTRACTOR SHALL HAVE THE OPTION OF SELECTING CASING SIZE BASED UPON HIS AVAILABLE BORING/TUNNELING EQUIPMENT PER THE THREE (3) CASING DIAMETER AND ASSOCIATED CASING THICKNESS INDICATED IN THE TABLE BELOW. THE PRICE FOR THE SELECTED CASING DIAMETER/THICKNESS AND INSTALLATION OF THE ASSOCIATED GUARANTEED BORE/TUNNEL SHALL BE INDICATED IN PAY ITEM X.

CASING SIZE (INCHES)	CASING THICKNESS (INCHES)
48	0.750
54	0.875
60	0.875

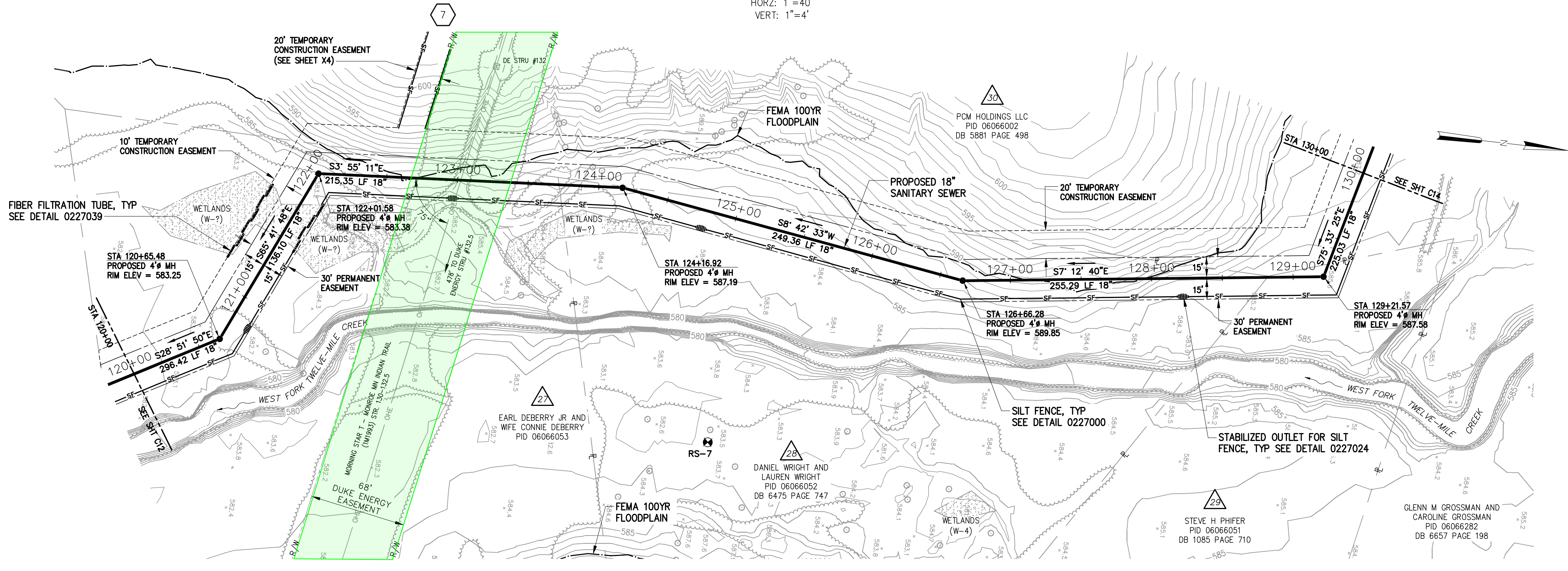


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NO. ISSUED FOR DATE BY APPROVED		H & S JOB NUMBER 30831-049	CONTRACT NUMBER DRAWING NUMBER C10						

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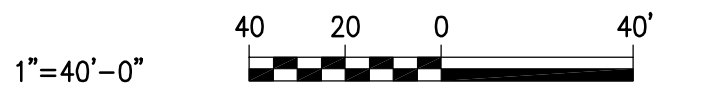
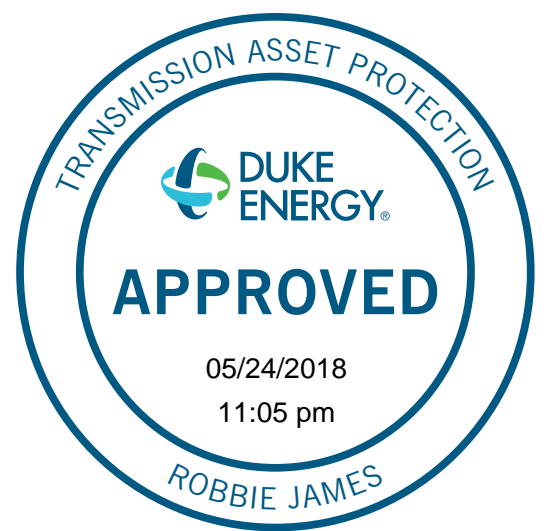


PROFILE
 HORZ: 1"=40'
 VERT: 1"=4'



PLAN
 1"=40'

NOTES:
 1. SEE DUKE ENERGY NOTES ON SHEET X3 FOR WORK WITHIN DUKE ENERGY TRANSMISSION EASEMENT.



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UNION COUNTY
 NORTH CAROLINA
 WEST FORK TWELVE-MILE CREEK
 INTERCEPTOR

WEST FORK TWELVE-MILE CREEK
 INTERCEPTOR
 STA 120+00 TO STA 130+00

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	MAY 2018
	H & S JOB NUMBER	30831-049
	CONTRACT NUMBER	
	DRAWING NUMBER	C13

USE GUIDELINES FOR ENCROACHMENTS INVOLVING TRANSMISSION EASEMENTS

Duke Energy has a property interest called an easement (or sometimes a right-of-way) in land that you own or are considering purchasing. This easement grants Duke Energy the right to use the easement area for purposes described in the easement document that is filed and recorded in the county's recorder office. This property interest stays with the land when it is bought and sold and generally is perpetual in duration. A series of easements often form a corridor in which the transmission facilities are located and access up and down the corridor is part of the reason Duke Energy obtains these rights.

Broadly stated, easements allow Duke Energy to use another person's property to construct, operate, maintain, repair, and replace electrical facilities for the transmission of high voltage power. The landowner may continue to use the easement area so long as the use is not inconsistent with the easement document or Duke Energy's use of the easement. Any incompatible use by the landowner is called an encroachment. Where an encroachment is under construction, Duke Energy will request that it be stopped and removed; where an encroachment is already installed, Duke Energy will request that it be removed. Where a landowner fails to cooperate, Duke Energy will seek legal recourse to remove the encroachment.

Electricity is a public service and subject to state and federal regulations with which Duke Energy must comply. Any use by the landowner that does or could create regulatory issues is an encroachment. Power lines in the transmission easement are uninsulated and electricity is a dangerous instrumentality. Any landowner use that increases the danger to the landowner, the public or Duke Energy in its use of the easement is also an encroachment.

Over years of designing, constructing, operating, repairing, upgrading and maintaining electric facilities in transmission easements, Duke Energy has developed an understanding of the types of uses by landowners that do, or potentially can, interfere with the easement's purposes and Duke Energy's ability to provide safe and reliable service. This guidance, which supersedes all prior versions, provides a brief overview of types of things that do, or can, interfere with Duke Energy's easement rights and thereby create encroachments.

This overview cannot address all possible situations and is intended to provide general guidance. Please contact the Asset Protection Specialist if you have additional questions or concerns about the use of the easements. Please discuss any proposed activity in the transmission easements with Duke Energy to avoid creating an encroachment or interference. The Asset Protection Specialist can assist and help avoid a subsequent need by the landowner to revise plans or remove obstructions from the easements. Engineering plans may be required by Duke Energy to fully understand any proposed use by the landowner.

By providing these guidelines, Duke Energy does not waive any rights it has in its easements or under the law. Duke Energy's concurrence that a proposed use does not constitute an interference with its easement rights does not mean that requirements of local, county, state or federal governments or other agencies with governing authority have been met.

The following are not permitted in Duke Energy's transmission easements as they interfere with Duke Energy's use of the easements for transmission of electricity by, among other things, interfering with full use the easement, interfering with existing facilities, interfering with access to the facilities, interfering with future expansion in the easement, increasing the danger to the public or those who may be required to work in the easement, creating regulatory violations and generally, making the transmission of electricity more dangerous, costly and/or unreliable: Examples include but are not limited to:

- Permanent or temporary structures and buildings, including for example, permanent or manufactured/mobile homes (and home additions and extensions), garages, sheds, satellite systems, intersections, cul-de-sacs, entrances, streets, swimming pools (any associated equipment and decking), playground equipment, graves, billboards, dumpsters, signs, wells, deer stands, retaining walls, septic systems or tanks (whether above or below ground).
- Mounding or stockpiling any material, such as spoils, dirt, logs, construction or building material, wrecked or disabled vehicles, (e.g. may create clearance and access issues and/or increases dangers in using the easement).
- Transformers, telephone/cable pedestals and associated equipment (unless specifically addressed in a joint use agreement), fire hydrants, manholes, water valves, water meters, backflow preventers & irrigation heads, (e.g. may increase the likelihood of safety hazards & access issues).

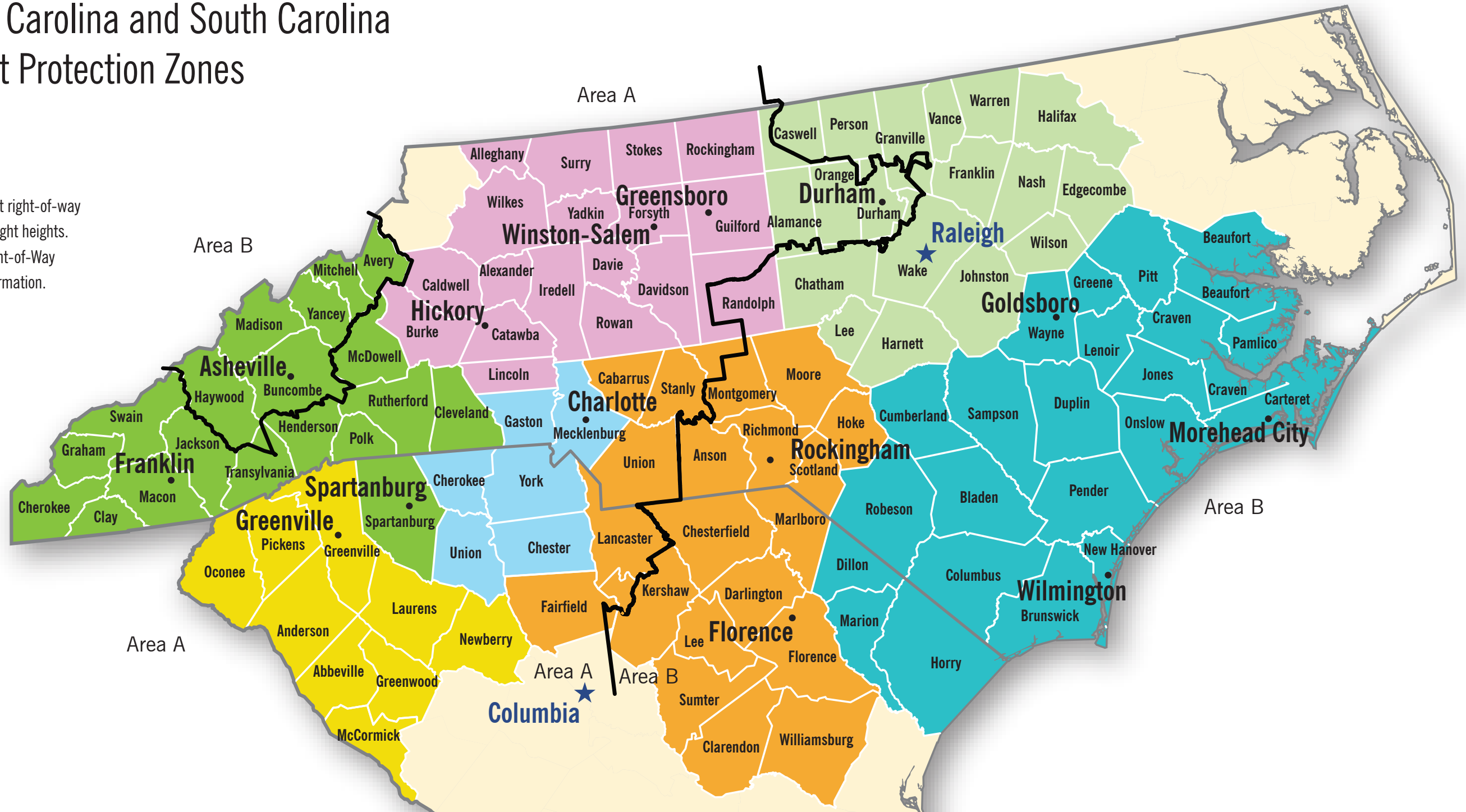
- Attachments to Duke Energy structures in the easement; (unless specifically addressed in a joint use agreement).
- Streets, roads, driveways, sewer/water lines, other utility lines or any underground facilities that run in parallel to the centerline in the easement or cross in one contiguous segment from outside edge of easement to opposing outside edge of easement, at any angle that is less than 30 degrees or greater than 90 degrees as measured from the centerline. No portion of such facility shall be located within 25 feet of Duke Energy's facilities (unless specifically addressed in a joint use agreement.)
- Fences or utilities that cross the easement in multiple segments in a non-continuous alignment from outside edge of easement to opposing outside edge of easement at any angle of less than 30 degrees or greater than 90 degrees as measured from the centerline. This generally creates an interference as the ability to access and utilize the full easement and reach facilities in the easement is substantially impaired. If a fence crosses the easement at an angle greater than or equal to 30 degrees and less than or equal to 90 degrees with the centerline, a gate (16 feet wide at each crossing) shall be installed by the landowner, per Duke Energy's specifications. Duke Energy will supply a lock. The landowner is required to install the Duke Energy lock on the gate to ensure access. The lock can be interlocked with the landowner's lock. Fences and gates that exceed 10 feet in height are prohibited because they create a clearance issue and are an interference. Fences that inhibit Duke Energy's access because they lack a gate that is at least 16 feet wide, interfere with Duke Energy's easement use.
- Grading (cuts or fill) in the easement that is closer than 25 feet to transmission facilities i.e. poles, towers, guys and anchors and/or slopes greater than 4:1 no matter where located or that otherwise change clearances or topography.
- Parking or lighting facilities which affect clearances, access or Duke Energy's ability to make full use of its easement.
- Placement of combustible materials and/or the purposeful burning of anything within the easement are inconsistent with electric facilities, the transmission of power and create safety hazards and system reliability issues.
- Any water feature in the easement, such as a detention and retention pond, stream or lake. Where a structure outside the easement causes erosion or directs storm water toward the easement or the electric facilities or access to or around the electric facilities, such structure will interfere with Duke Energy's use and must be altered to eliminate that effect.
- Incompatible vegetation above ground transmission lines - Vegetation within or outside of the transmission easement that will mature to a height or size that will pose a grow-in, fall-in, or blowing-together threat to the transmission conductor (typical maximum mature height greater than 15 feet within the transmission easement depending on location and voltage).
- Incompatible vegetation underground transmission lines - Vegetation within or outside of the transmission easement that is capable of posing a threat (e.g., root systems, etc.) to the underground transmission conductor by a) causing damage to the underground pipes / cables or b) reducing the moisture in the soil, thus altering the thermal properties of the surrounding soil / backfill and thereby negatively impacting the cable ampacity rating (typical maximum mature height within the easement - greater than 3 feet depending on location and voltage).
- Incompatible vegetation for safe and reliable operation and access on all transmission lines - Vegetation that will limit or block access, limit the safe and reliable operation, emergency restoration, or maintenance of the transmission facilities, limit the full use of the transmission easement for its intended purposes or vegetation which is typically within a horizontal distance of 25 feet of any Duke Energy facilities (towers, poles, guy wires, guy anchors, manholes, dip-poles, substation equipment, etc.).

As discussed, these guidelines are not exhaustive and there may be other interferences on a case-by-case basis depending on individual circumstances. Certain conditions such as line voltage, line criticality, frequency of required access and structure type may require heightened restrictions in the easements to provide safe and reliable service.

If you have additional questions or plan any activity not mentioned above, please contact customer service and ask for your local Transmission Asset Protection Specialist.

Duke Energy North Carolina and South Carolina Transmission Asset Protection Zones

Area A and Area B have different right-of-way restrictions related to tree and light heights. Please refer to the attached Right-of-Way Restrictions Guide for more information.



Asset Protection Right-of-Way Specialist Zones

- | | | | |
|--|---|--|--|
| ■ Zone 1 – Craig Garrett 828.258.5018
craig.garrett@duke-energy.com | ■ Zone 3 – Stephen Lord 704.812.2316
stephen.lord@duke-energy.com | ■ Zone 5 – Lorick Fanning 910.944.5249
lorick.fanning@duke-energy.com | ■ Zone 7 – Bruce Pait 919.431.4831
bruce.pait@duke-energy.com |
| ■ Zone 2 – Johnny Wagner 864.234.4382
jonathan.wagner@duke-energy.com | ■ Zone 4 – Ethan Pardue 336.526.2524
ethan.pardue@duke-energy.com | ■ Zone 6 – Bill Wilder 910.772.4903
bill.wilder@duke-energy.com | |

Legend – updated 12/17/19



Your safety is our priority

We have a goal at Duke Energy – to eliminate injury and death from needless power line contacts. We want to provide you with the information you need to stay safe at work.

Important OSHA minimum approach regulation

The following table is from OSHA 1910.333 and applies to nonqualified persons working in proximity to energized power lines. The minimum approach distance is to be maintained for nonqualified workers. When using equipment classified as a crane or derrick, OSHA 29 CFR 1926.1407-1411 must be followed.

OSHA - 1910.333 Applies to NonQualified Persons Minimum Approach Distance	
Up to 50 kV	10 Feet
50 kV up to 200 kV	15 Feet
200 kV up to 350	20 Feet
350 to 500 kV	25 Feet
500 kV to 750 kV	35 Feet

Important OSHA crane regulation

Cranes and derricks near transmission power lines – OSHA 29 CFR 1926.1407-1411

This regulation applies to power-operated equipment used in construction that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to:

If any part of equipment, load line or load could get closer than 20 feet to less than 350 kV power lines or 50 feet for greater than 350 kV power lines, you must speak with a Duke Energy representative before beginning work.

Such equipment includes, but is not limited to:

- Articulating cranes (such as knuckle boom cranes)
- Floating cranes
- Locomotive cranes
- Multipurpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
- Industrial cranes (such as carry deck cranes)
- Pedestal cranes
- Straddle cranes
- Derricks
- Overhead bridge and gantry cranes NOT permanently installed
- Crawler cranes
- Cranes on barges
- Side boom tractors
- Base-mounted drum hoists only when used with derricks
- Tower cranes
- Portal cranes
- Service/mechanic trucks with a hoisting device
- Dedicated pile drivers
- Mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted and boom truck cranes)
- Variations of these types of equipment



Look up and live.

Working around high-voltage transmission lines



Know how to protect yourself, your crew and the public when working around transmission lines.

Contact us

For more information, please visit duke-energy.com/safety or call:

Duke Energy Carolinas
800.777.9898 or 800.POWERON

Duke Energy Indiana
800.521.2232

Duke Energy Kentucky or Ohio
800.544.6900

Duke Energy Progress
800.452.2777

Duke Energy Florida
800.700.8744

Duke Energy cares about your safety. This brochure contains important information for:

- Anyone working around power lines
- Grading contractors
- Forklift operators
- Crane operators
- Developers (residential, commercial, industrial)
- Architects and engineers
- Dump truck operators

550 South Tryon Street
Charlotte, NC 28202



www.duke-energy.com

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Know your voltage, know your clearance

A planned project is a safe project

Federal law requires that all contractors maintain at least a 10-foot clearance from overhead power lines up to 50 kV. Greater clearance is required for higher-voltage power lines and cranes and derricks in construction.

Contact Duke Energy at least three working days before you start working near overhead power lines and equipment so that safety recommendations can be made.

Treat all transmission lines, regardless of their operating voltage, with caution:

- 44 kV and 100 kV lines look similar.
- Never assume a voltage based on the illustration.
- Minimum clearance includes maximum sag, which must be calculated for each instance.
- Injury or death can occur without touching power lines.
- Assume all overhead power lines are energized.
- Contact Duke Energy if you are in doubt about safe operating distances.

Fact 1.

Power lines that serve your homes and businesses are not insulated like home appliance cords.

Fact 2.

Power lines carry 4,000 to 500,000 volts of electricity that can seriously injure or kill on contact.

Fact 3.

The simplest way to stay safe is to know where your power lines are located and stay away.

Check the job site for hazards and know the location of all overhead power lines and electric equipment, including poles and guy wires.

Consider all overhead lines as energized. Mark the work site boundaries to keep workers, vehicles, tools and equipment a safe distance from electric lines and equipment.

Hold a pre-work safety meeting, pointing out areas where overhead lines and electric equipment are located.

We can help you:

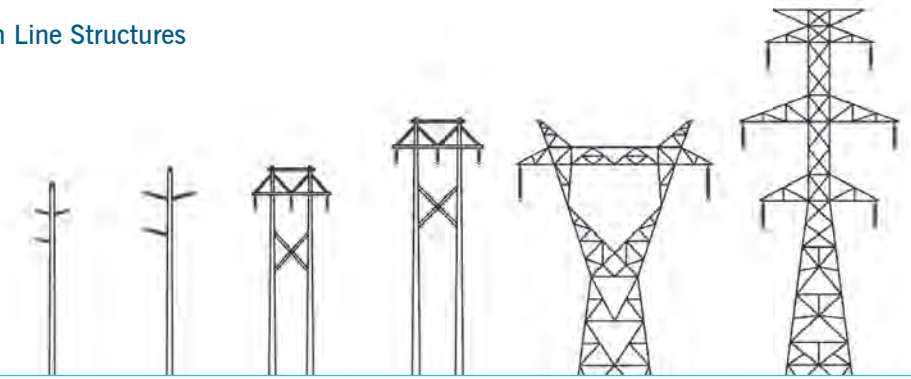
- Confirm voltage
- Confirm clearance
- Confirm wire height under peak conditions
- Provide safety guidance around power lines
- Review and approve drawings for:
 - Compliance with right-of-way restrictions
 - Compliance to National Electric Safety Code
- Identify the best, safe solution

Emergency situations

If your equipment makes contact with an overhead power line, notify Duke Energy immediately and take these precautions:

- Have someone call 911.
- Do not attempt to turn off engines or generators.
- Move equipment away from the line only if it is safe to do so.
- Remain on equipment until utility workers arrive and de-energize the line.
- Warn others to stay away. Those on the ground can be injured or killed if they make contact with the equipment.
- If you must leave the equipment because of fire or other dangers, jump off with your feet together. Never touch the ground and equipment at the same time. Keeping your feet together, shuffle or hop away until you are clear of the area.

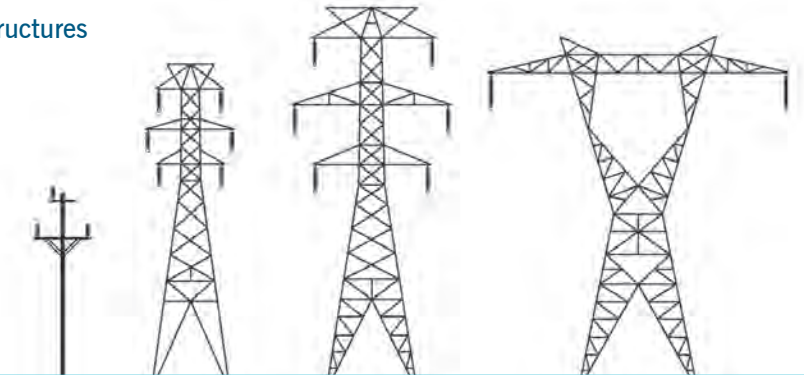
Duke Energy Midwest Transmission Line Structures



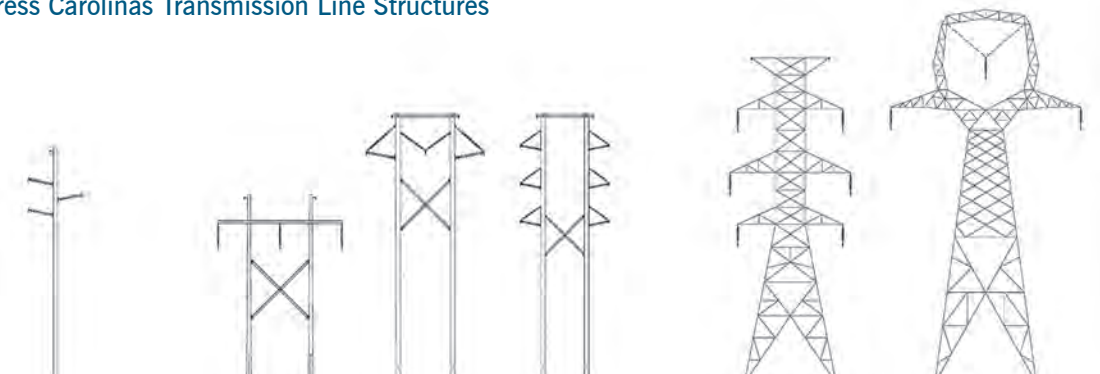
Duke Energy Florida Transmission Line Structures



Duke Energy Carolinas Transmission Line Structures



Duke Energy Progress Carolinas Transmission Line Structures



For more information, visit duke-energy.com/safety.

NCDEQ Fast-Track Wastewater Collection Permit



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

LINDA CULPEPPER
Interim Director

June 19, 2018

John Shutak, CIP Program Manager
Union County Public Works
500 North Main Street, Suite 500
Monroe, NC 28112

Subject: Permit No. WQ0040078
Union County Public Works
West Fork Twelve-Mile Creek Interceptor
Wastewater Collection System Extension Permit
Union County

Dear Mr. Shutak:

In accordance with your application received June 15, 2018, we are forwarding herewith Permit No. WQ0040078 dated June 19, 2018, to the Union County Public Works (Permittee) 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 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.

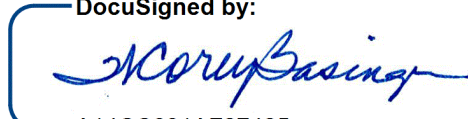
It shall be the responsibility of the Permittee to ensure that the as-constructed project meets the appropriate design criteria and rules. Failure to comply may result in penalties in accordance with North Carolina General Statute §143-215.6A through §143-215.6C, construction of additional or replacement 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 Ori Tuvia at (704) 235-2190 or via e-mail at ori.tuvia@ncdenr.gov.

Sincerely,

DocuSigned by:



A14CC681AF27425...

by W. Corey Basinger, Regional Supervisor
Water Quality Regional Operations Section
Division of Water Resources, NCDEQ

cc: James Struve (P.E.) (E-copy)
Mooresville Regional Office Files (Laserfiche)
Water Resources Central Files (Laserfiche)
PERCS (Laserfiche)



STATE OF NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT COMMISSION
DEPARTMENT OF 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 the

**Union County Public Works
Union County**

for the construction and operation of approximately 1,390 linear feet of 8-inch gravity sewer; 13,007 linear feet 18-inch gravity sewer; 10,393 linear feet 24-inch gravity sewer, as part of West Fork Twelve-Mile Creek Interceptor Development, and the discharge of 0 additional gallons per day of collected wastewater into the Union County Public Works existing sewerage system, pursuant to the application received June 15, 2018, 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:

A handwritten signature in blue ink that reads 'W. Corey Basinger'. The signature is enclosed in a blue rounded rectangular box.

A14CC681AF27425...

by W. Corey Basinger, Regional Supervisor
Water Quality Regional Operations Section
Division of Water Resources, NCDEQ

By authority of the Environmental Management Commission

Permit Number: WQ0040078
Permit Issued: June 19, 2018

SUPPLEMENT TO PERMIT COVER SHEET

Union County Public Works 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 Twelve Mile Creek Regional Wastewater Treatment Facility in accordance with Permit Number NC0085359.

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.

Construction and operation is contingent upon compliance with the Standard Conditions and any Special Conditions identified below.

I. SPECIAL CONDITIONS

1) No flow in excess of the quantity permitted herein, 0 additional GPD, shall be made tributary to the subject sewer system until an application for permit modification for an increase in flow has been submitted to and approved by the Division. [15A NCAC 02T.0304 (b)]

II. STANDARD CONDITIONS

1. This permit is not 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 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 Mooresville Regional Office, telephone number (704) 663-1699, 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 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 increases 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 maybe required by the Division or any other Federal, State, of Local government agencies. [G.S. 143-215.1(b)]

FAST TRACK SEWER ENGINEERING CERTIFICATION

PERMITTEE: UNION COUNTY PUBLIC WORKS

PERMIT #: WQ0040078

PROJECT: WEST FORK TWELVE-MILE CREEK INTERCEPTOR

ISSUE DATE: JUNE 19, 2018

This project shall not be considered complete nor allowed to operate in accordance with standard 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 to the Regional Supervisor, Water Quality Regional Operations Section at the address noted in the page footer.

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 by the Division. 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):

Weddington Flood Study Permit

TOWN OF WEDDINGTON
FLOODPLAIN DEVELOPMENT PERMIT

Permit Number: _____
Issuance Date _____ PIN See Permit Application (attached) Or Deed Book/Page _____

In accordance with the Town of Weddington Flood Damage Prevention Ordinance, a Floodplain Development Permit is hereby granted to:

Union County Public Works Department

to conduct development activities within the area of special flood hazard on property located at:

The West Fork Interceptor will connect to existing waste water infrastructure to the north of Weddington Road (SR 84) and east of Deal Road (downstream tie-in) and to the east of Lytton Lane at the existing Brookhaven Pump Station (upstream tie-in).

Flood Zone: AE FIRM Map Panel No.: #3710448500J, #3710448600J #3710448700J Map Panel Date: 02/19/14

This Permit is issued to the aforementioned individual, firm, partnership, etc. for the purpose noted above and in accordance with the Town of Weddington Flood Damage Prevention Ordinance, Floodplain Development Permit No. _____ and attachments thereto; and is subject to the following modifications and/or performance reservations:

1. Permit issued for the following development only.
Excavation: _____ Fill: _____ Grading: _____ Utility Construction: X
Road Construction: _____ Residential Construction: _____ Nonresidential Construction: _____
Addition: _____ Renovation: _____
Other (specify): Approx. 24,790 LF of gravity sewer line and manholes
(Specify the limitations of this permit so there will be no doubt of coverage under its issuance.)
2. The lowest floor and all attendant utilities shall be at or above N/A feet Mean Sea Level (MSL) (NAVD 1988).
3. Public Utilities shall be at or above see construction plans feet Mean Sea Level (MSL) (NAVD 1988).
4. Pursuant to Section 58-482(c) of the Town of Weddington Flood Damage Prevention Ordinance, it shall be the duty of the permit holder to submit to the Floodplain Administrator the Elevation/ Floodproofing Certification and/or other certifications as required prior to actual start of any new construction.
5. No fill material or other development shall encroach into the floodway or non-encroachment area of West Fork Twelve Mile Creek (name of watercourse).
6. Flood openings area required for foundation wall: N/A
7. The development will comply with all appropriate Federal, State, and Local regulations.
8. Limitations of below BFE enclosure uses: N/A
9. Required certifications shall be submitted by N/A
10. Other: See Flood Study Narrative and Engineer's certification prepared by Hazen and Sawyer dated October 25, 2018.

Failure to comply with the Town of Weddington Flood Damage Prevention Ordinance including any modifications and/or performance reservations could result in assessment of civil penalties or initiation of civil or criminal court actions as defined in Section 58-458 of the Town of Weddington Flood Damage Prevention Ordinance.

Issued this 6 day of December, 2018.



Floodplain Administrator for Town of Weddington

**TOWN OF WEDDINGTON
FLOODPLAIN DEVELOPMENT PERMIT APPLICATION**

Date: 10/19/2018

Permit Number: _____

Received by: _____

Property P.I.N.: See next page.

Location of Property: The West Fork Interceptor will connect to existing waste water infrastructure to the north of Weddington Road (SR 84) and east of Deal Road (downstream tie-in) and to the east of Lytton Lane at the existing Brookhaven Pump Station (upstream tie-in).

Type of Development:

Excavation: _____ Fill: _____ Grading: _____ Utility Construction: X
Road Construction: _____ Residential Construction: _____ Nonresidential Construction: _____
Addition: _____ Renovation: _____ Other (specify): _____

Size of Development: 24,790 LF

FIRM Data: Map Panel No.: #3710448500J, #3710448600J #3710448700J Suffix J Map Panel Date: 02/19/14

Flood Zone: AE Map Index Date: 10/16/08

Regulatory Floodway/Non-Encroachment Area Info:

Inside Regulatory Floodway/Non-encroachment area X No Regulatory Floodway/Non-encroachment area provided _____

Development Standards Data (Insert "N/A" if Not Applicable to the project):

1. Attach engineering certification and supporting data as required by Sections 58-482 and 58-516 of the Town of Weddington's Flood Damage Prevention Ordinance.
2. Base flood elevation (BFE) per FIRM at development site See Flood Study Narrative. (NAVD 1988).
3. Regulatory flood elevation at development site (BFE + 2 feet): N/A (NAVD 1988).
4. Elevation in relation to mean sea level (MSL) at or above which the lowest floor (including basement) must be constructed N/A (NAVD 1988).
5. Elevation in relation to mean sea level (MSL) at or above which all attendant utilities to include, but not limited to, all heating, air conditioning and electrical equipment must be installed N/A (NAVD 1988).
6. Will garage or other structures (if applicable) be used for any purpose other than parking vehicles, building access, or storage? N/A. If yes, then the garage or structure must be used in determining the lowest floor elevation.
7. Proposed method of elevating the structure: N/A
(a) If foundation wall is used - provide minimum of 2 openings
(b) Total area of openings required: N/A (1 sq. inch per sq. foot of enclosed footprint area below BFE)
8. Will any watercourse be altered or relocated as a result of the proposed development? No.
If yes, attach a description of the extent of the alteration or relocation.
9. Floodproofing information (if applicable):
Elevation in relation to mean sea level (MSL) to which structure shall be floodproofed N/A (NAVD 1988).

Applicant acknowledgment: I the undersigned understand that the issuance of a floodplain development permit is contingent upon the above information being correct and that the plans and supporting data have been or shall be provided as required. I also understand that (1) prior to final plat approval an as-built survey of the proposed site improvements along with professional engineer certification must be on file with the Town of Weddington indicating that the improvements were built in accordance with the approved construction drawings; and (2) prior to occupancy of the structure being permitted, an elevation and/or floodproofing certificate signed by a professional engineer or registered land surveyor must be on file with the Town of Weddington indicating the "as built" elevations in relation to mean sea level (MSL).

Print or Type Name of Agent

LISA THOMPSON

Signature of Agent & Date

[Signature] 12/6/18

Address & Telephone Number

1924 Weddington Rd.
Weddington NC 28104
704 846 2709

Print or Type Name of Applicant

Stephen Sands

Signature of Applicant & Date

[Signature]
10/19/18

Address & Telephone Number

9101 Southern Pine Blvd., Suite 250, Charlotte, NC, 28273
704-357-3150

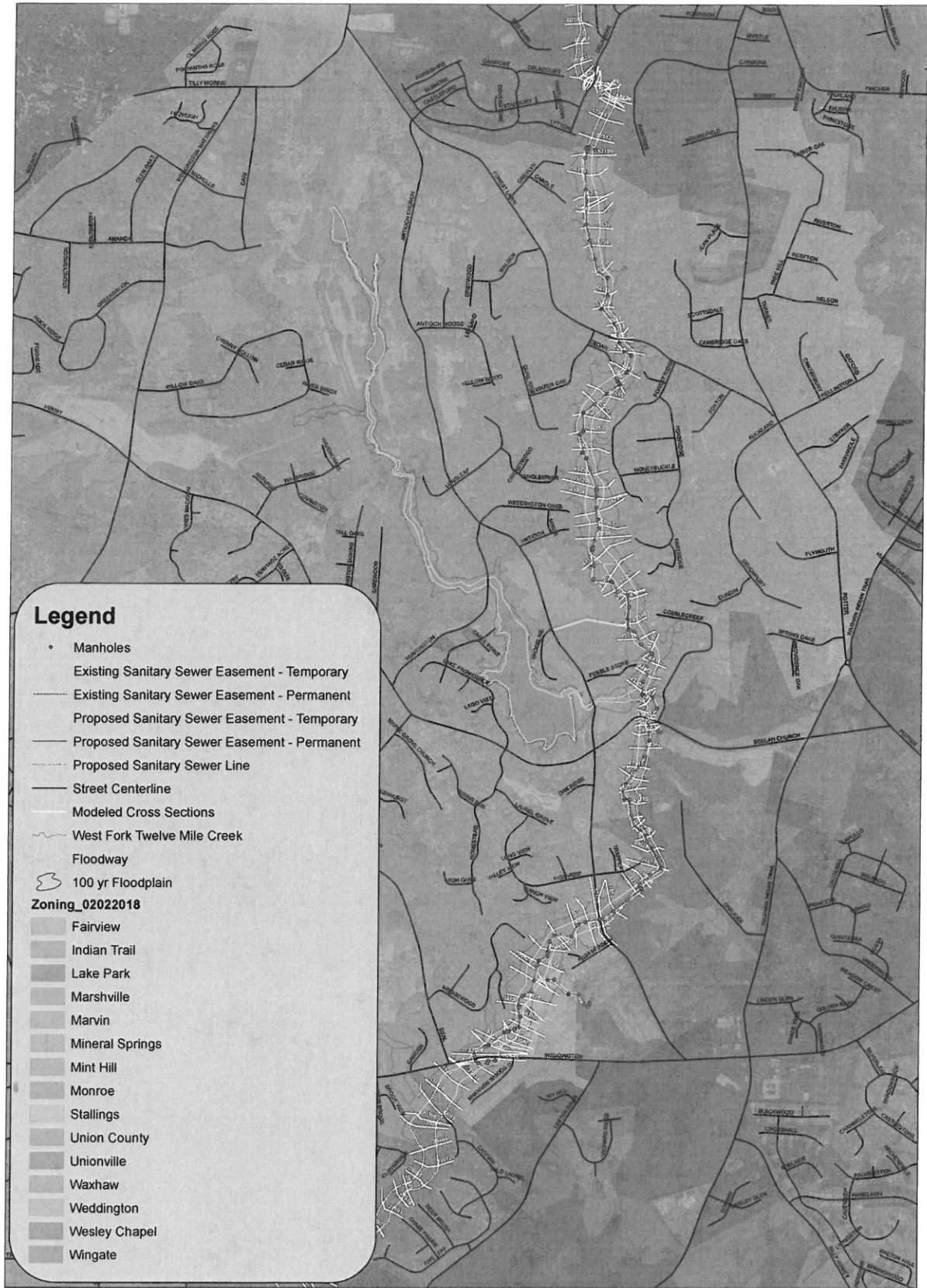
Foundation Inspection Date: _____

Inspector: _____

This project is located on the following parcels with P.I.N numbers:

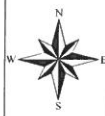
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WEST FORK INTERCEPTOR
UNION COUNTY PUBLIC WORKS DEPARTMENT



Legend

- Manholes
- Existing Sanitary Sewer Easement - Temporary
- Existing Sanitary Sewer Easement - Permanent
- Proposed Sanitary Sewer Easement - Temporary
- Proposed Sanitary Sewer Easement - Permanent
- Proposed Sanitary Sewer Line
- Street Centerline
- Modeled Cross Sections
- West Fork Twelve Mile Creek
- Floodway
- 100 yr Floodplain
- Zoning_02022018**
- Fairview
- Indian Trail
- Lake Park
- Marshville
- Marvin
- Mineral Springs
- Mint Hill
- Monroe
- Stallings
- Union County
- Unionville
- Waxhaw
- Weddington
- Wesley Chapel
- Wingate



1 inch = 1,000 feet
 0 1,250 2,500 5,000 Feet

Hazen



West Fork Twelve Mile Creek Interceptor Project



West Fork Twelve Mile Creek Flood Study


Application for Permit to Develop in a Flood Hazard Area

October 2018



Section 3 Conclusion

This is to certify that I am a duly qualified engineer licensed to practice in the State of North Carolina. The proposed project (as shown on the September 2018 certified for regulatory review plan set) does not result in change in hydrology during the 100-year existing conditions and 100-year future conditions storm events. It is to further certify that the attached technical data (September 2018 certified for regulatory review plan set) supports the fact that the proposed sanitary sewer gravity main will not impact the Base Flood Elevations (100-year flood), Floodway Elevations and the Floodway Widths of West Fork Twelve Mile Creek at published sections in the Flood Insurance Study for Union County, Community Number # 370518, dated 02/19/2014.

Signature: 

Phone Number: (704)-357-3150

E-mail: ssands@hazenandsawyer.com

Representing: Hazen and Sawyer

Address: 9101 Southern Pine, Boulevard Suite 250

City/State/Zip Code: Charlotte, NC 28273