Prepared For:

CITY OF GREENVILLE (CITY)
2000 CEDAR LANE
GREENVILLE, NORTH CAROLINA 27858

CITY OF GREENVILLE
GREENVILLE TOWN COMMON & ESPLANADE PROJECT
GREENVILLE, NORTH CAROLINA

ISSUED FOR BID

M&N PROJECT NO. 221315-02

FEBRUARY 14, 2025

Submitted By:

moffatt & nichol

4700 Falls of Neuse Road, Suite 300
Raleigh, North Carolina 27609
919-781-4626
M&N Project No. 221315-02
NC Firm License No. F-0105

SECTION 00 11 13 – ADVERTISEMENT FOR BIDS

The Greenville Recreation and Parks Department (GRPD) will accept bids for the Town Common Bulkhead and Esplanade project on **March 20, 2025.** Sealed Proposals will be received by the City in the Jaycee Park Meeting Room, 2000 Cedar Lane, Greenville, NC 27858, at 2:00pm (Eastern Standard Time) and publicly opened thereafter at 2:00pm. Bids shall be marked "Sealed Bid", addressed to the attention of Mark Nottingham, Greenville Project Management Department, and shall include the Name, Address, and License Number of the bidder, and the type of proposal enclosed.

Contractors interested in bidding as prime bidders are required to attend the open **mandatory pre-bid meeting** which will be held Tuesday **March 4th at 10:00 am** at the Town Common, 105 East First Street, Greenville, NC 27858. We will meet at the east end of the bulkhead.

Complete plans and specifications for the project will be available from the City of Greenville website at https://www.greenvillenc.gov/government/financial-services/current-bid-opportunities for download**.**
The City Council of the City of Greenville reserves the right to reject any or all proposals.
Owner:
Mark Nottingham
City of Greenville Project Management Department
2000 Cedar Lane
Greenville, NC 27858
(252) 329-44242
mnottingham@greenvillenc.gov

Engineer:
Moffatt & Nichol
4700 Falls of Neuse Rd, Suite 300
Raleigh, NC 27609
(919) 781-4626

END OF SECTION 00 11 13

SECTION

A

SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 Bids will be received for Single Prime Contract. All proposals shall be for lump sum. It is the intent of the City to award this bid to the lowest responsive and responsible bidder.

1.2 Bidders are requested to return bids to the City of Greenville Project Management Department prior to bid opening. Bids will be opened promptly at the time specified in the Invitation to Bid. Bidders are cautioned to be prompt since No Bids Will Be Accepted after the time designated for the bid opening. The precise time will be monitored by the person responsible for opening the bids.

1.3 All bids submitted must be on the blank proposal forms herein provided and prices given shall be both in writing and figures and the complete form shall be without any lineation, alterations, or erasures. In case of conflicting prices, the written prices shall govern.

1.4 Bids shall be enclosed in a sealed envelope, directed to the City of Greenville, Project Management Department, 2000 Cedar Lane, Greenville, North Carolina 27858, and marked with the bidders North Carolina Contractor's License number. All bids must be marked Bid on the outside of the envelope.

1.5 Each proposal shall contain the full name, address, phone number, and email of each bidder. When firms bid, the name of each member shall be signed and the firm name added, and the execution shall be done as more specifically stated herein under the following section.

1.6 The omission of prices upon any item for which bids are asked or the tendering of an unbalanced bid will be the cause of the rejection of the bid submitted.

1.7 No bid shall be considered or accepted by the City unless at the time of its filing, it is accompanied by a deposit of cash, or a cashier's check, or a certified check on some bank or trust company insured by the Federal Deposit Insurance Corporation in an amount equal to not less than five percent (5%) of the bid. In lieu of making that deposit, the bidder may file a bid bond executed by a corporate surety licensed under the laws of North Carolina to execute such bonds, conditioned that the surety will upon demand forthwith make payment to the City of Greenville upon the bond if the bidder fails to execute the contract in accordance with the bid bond. This deposit shall be retained by the City if the successful bidder fails to execute the contract within 10 days after the award or fails to give satisfactory bonds or deposit as required herein. The bidder to whom the award of contract is made shall either (a) furnish bonds as required by Article 3 of Chapter 44A of the N.C. General Statutes, using the form supplied by the City; or (b) deposit with the City money, certified check or government securities. The bonds or deposit shall be for the full amount of the contract to secure the faithful performance of the terms of the contract and the payment of all sums due for labor and materials in a manner consistent with Article 3 of Chapter 44 A.

1.8 General Contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for general contractor.

A. NOTE: Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure, or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore, a single prime project that involves other trades will require the single prime contractor to hold a proper General Contractors license.

1.9 Except to the extent allowed by statute, bids shall not be withdrawn and bids shall remain subject to acceptance by the City for a period of 90 days.

1.10 Bidders must present satisfactory evidence that they have been regularly engaged in the business of constructing such work, and that they are fully prepared with the necessary capital, equipment, etc., to begin the work promptly, and complete the same in accordance with specifications.

1.11 The bids will be evaluated and the contract awarded in accordance with statutory public contract requirements as supplemented or altered by the Minority and / or Women Business Enterprise (M/WBE) requirements supplied with this bid package. These forms must be filled out and returned with the bid proposal. Any bids submitted without these completed forms shall be deemed as "non-responsive". If there are any questions or problems filling out these forms, please contact:

A. Wanda House, Financial Services Manager 252-329-4862

1.12 The City of Greenville, NC in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 US.C. §§ 2000d to 2000d-4) and the Regulations, hereby 1178814- v4 7 notifies all respondents that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this advertisement and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

1.13 The successful bidder is required to commence work within ten (10) written days after written notice from the Project Manager. Termination of work shall also be controlled by the City of Greenville.

1.14 The contractor will furnish all materials, labor, equipment, supervision, tools, machinery, etc. for complete construction of projects in accordance with plans and specifications of the City of Greenville.

1.15 The bidder to whom the award is made shall be required to furnish work crews of adequate number, size, and experience to properly perform the work. The interpretation of the number of crews, size, and experience will be determined by the City of Greenville as to their adequacy.

1.16 It shall be the responsibility of the contractor to obtain all necessary and required permits and inspections. These permits shall be presented upon demand.

1.17 The Contractor will perform, or have performed, all necessary site layout (both lines and grades) for this construction.

1.18 The Contractor must provide the City of Greenville a safety plan of their organization, prior to approval of the contract.

1.19 The following standard documents shall be used for their intended purposes unless the Owner consents to use other forms:

A. Standard Form of Agreement Between Owner and Contractor

B. General Conditions of the Contract for Construction.

1.20 The contractor(s) to whom the award is made must carry insurance in the amounts and types outlined in the Insurance Requirements section of this document.

1.21 The insurance herein required shall be with an insurance company authorized to do business in North Carolina and having a BEST rating of A or better.

1.22 Insurance shall be evidenced by a certificate:

A. Providing notice to the City of not less than 30 days prior to cancellation or reduction of coverage

B. Certificates should be addressed to:

1. City of Greenville Project Management Department Attn:
Mark Nottingham
2000 Cedar Lane
Greenville, NC 27858

1.23 INSURANCE:

The Contractor agrees to purchase at its own expense insurance coverages to satisfy the following minimum requirements. Work under this contract shall not commence until all insurance required as listed has been obtained. Insurance required shall remain in effect through the life of this contract.

A. Worker's Compensation Insurance

No contractor or subcontractor may exclude executive officers. Workers Compensation must include all employees.

Limits: Workers Compensation: Statutory for the State of North Carolina.

Employers Liability:	
Bodily Injury by Accident	$1,000,000 each accident.
Bodily Injury by Disease	$1,000,000 policy limit.
Bodily Injury by Disease	$1,000,000 each employee.

B. Commercial General Liability:

Limits: Each Occurrence:	$1,000,000
Personal and Advertising Injury	$1,000,000
General Aggregate Limit	$2,000,000
Products and Completed Operations Aggregate	$2,000,000

The aggregate limit must apply per project. The form of coverage must be the ISO CG 00 01 policy as approved by the State of North Carolina Department of Insurance. If a form of coverage other than the CG 00 01 is used it must be approved **Contractor**. Any endorsed exclusions or limitations from the standard policy must be clearly stated in writing and attached to the Certificate of Insurance. Completed Operations coverage must be maintained for the period of the applicable statute of limitations. Additionally, the **Contractor** must be added as an Additional Insured to the Commercial General Liability policy.

C. Commercial Automobile Liability:

Limits:	$1,000,000 combined single limit.

D. Cancellation:

Each certificate of insurance shall bear the provision that the policy cannot be altered or canceled in less than ten (10) days after mailing written notice to the assured of such alteration or cancellation, sent registered mail.

E. Proof of Carriages:

1. The Contractor shall provide the City with insurance industry standard ACCORD form Certificate(s) of Insurance on all policies of insurance and renewals thereof in a form(s) acceptable to the City prior to the commencement of services. Said policies shall provide that the City be an additional named insured.

2. The City shall be notified in writing of any reduction, cancellation, or substantial change of policy or policies at least thirty (30) days prior to the effective date of said action.

3. All insurance policies shall be issued by responsible companies who are acceptable to the City and licensed and authorized to do business under the laws of North Carolina

1.24 Hold Harmless and Indemnity Agreement:

A. To the fullest extent permitted by law, Company shall indemnify and hold harmless the City, its employees, agents, and consultants against any liability arising out of or in connection with any of the operations or obligations of Company, including but not limited to any said operations or obligations subcontracted or assigned to a different person or entity from claims, damages, losses, and expenses, including but not limited to attorneys' fees, which is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, caused by acts or omissions of Company or anyone directly or indirectly employed by them or anyone for whose acts the Company may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligation of indemnity which would otherwise exists as to a party or person described in this paragraph.

1.25 The successful bidder is required to commence work within ten (10) written days after written notice from the Project Manager. The City of Greenville shall also control termination of work.

1.26 All new vendors, including subcontractors/consultants, must register with the City of Greenville's online portal prior to the rendering of goods or services.

A. Registration as a vendor with the City of Greenville is the responsibility of prime or subcontractor/consultant, and requires the prospective new vendor to submit a W-9, and complete the registration through the City's vendor portal at the following web address: https://selfservice.greenvillenc.gov/vss/Vendors/default.aspx

B. If the prospective new vendor is only providing service(s) as a subcontractor/consultant, submission of payment information is not necessary at the time of registration.

1.27 The general contractor is responsible for ensuring all subcontractors working on the project are registered as vendors with the City of Greenville and have active registrations prior to contract award.

1.28 The general contractor must provide total amounts paid to MWBE subcontractors with each payment application/invoice.

1.29 Unit Prices: All unit prices shall be bid. Unit Prices shall be net, no profit or overhead shall be added or deducted when applying Unit Prices to the contract sum adjustments.

1.30 All work under this contract shall be completed within four hundred (400) days from the date of the Notice to Proceed.

1.31 E-VERIFY COMPLIANCE: The Contractor shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. Further, if the Contractor utilizes a Subcontractor, the Contractor shall require the Subcontractor to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. By submitting a proposal, The Proposer represents that their firm and its Subcontractors are in compliance with the requirements of Article 2 Chapter 64 of the North Carolina General Statutes.

1.32 IRAN DIVESTMENT ACT: Vendor certifies that: (i) it is not on the Iran Final Divestment List created by the NC State treasurer pursuant to N.C.G.S. 147-86.58; (ii) it will not take any actions causing it to appear on said list during the term of any contract with the City, and (iii) it will not utilize any subcontractor to provide goods and services hereunder that is identified on said list.

1.33 Any questions regarding the Contract Conditions and Bid Documents should be directed to Moffatt & Nichol, in writing by email to Jeff Swyers, jswyers@moffattnichol.com.

END OF SECTION 00 21 13

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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.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. 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, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.

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

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

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

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

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

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice 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.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

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

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *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.

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

38. *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, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

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

40. *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.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *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 for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: 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 Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;

2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

3. 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 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. 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 Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), 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;

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.

2.04 *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 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner 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 and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *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 the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are 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 the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.

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

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will 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.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

A. *Standards Specifications, Codes, Laws and Regulations*

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

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 part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

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 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers 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 versions, or 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; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract 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 Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *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.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, 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 Contract Price or Contract Times.

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

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing 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.

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 permanent improvements are to be made 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.

5.02 *Use of Site and Other Areas*

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

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

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, 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 any such claim, and against all 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 directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will 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 and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading of 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 structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on 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;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

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 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 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

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 Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a 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 otherwise;

b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly 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 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. 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 Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on 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;

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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

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

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly 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 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 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

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

G. 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, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. 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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. 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, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond 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 must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, 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.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is 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; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the 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, risks, 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 Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, 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.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. 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 all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, 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 fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *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 maintain good discipline and order at the Site.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *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, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will 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 must 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.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) 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;

3) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) 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

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. 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.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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 will be disclosed 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.

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *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.

7.11 *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. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and 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 such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

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

7.12 *Record Documents*

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

7.13 *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.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

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

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.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 at its expense (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).

E. 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.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. 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.

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

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

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

7.15 *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 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must 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 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall 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 7.16.C.

3. 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. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of 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, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.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 will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, 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.

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

   c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *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 is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, 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.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

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;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, 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 losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage 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 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. 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.

E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) 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 any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *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.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *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 (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.07. 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.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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, will 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 Contractor under Paragraph 15.06.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 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in 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;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-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, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will 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 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 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 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

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

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will 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 in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:

a. 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, 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.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will 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 communication 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 that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. 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.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *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*: Contractor agrees that:

1. 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

2. 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 for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's 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 for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *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. Payments to Contractor for Unit Price Work will be based on actual quantities.

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. 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, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction 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 with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

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

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

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

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

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

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages 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. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. 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, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then 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 will 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.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, 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, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *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.

2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, 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 13.03, 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; 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;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; 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 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens 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; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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 preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. 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 punch list.

15.04 *Partial Use or Occupancy*

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. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be 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 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work 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 15.03 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 6.04 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) 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, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: 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 have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *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 Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, 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. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. 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.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, 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.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

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);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to 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.

F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 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; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 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 16.03.

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, 7 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 are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *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. 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.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions.

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—for example, "Paragraph SC-4.05."

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

No Supplementary Conditions in this Article.

ARTICLE 2—PRELIMINARY MATTERS

No Supplementary Conditions in this Article.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.02 *Starting the Work*

SC-4.02 Add the following sentence immediately at the end of Paragraph 4.02.A.:

"Portions of the site will not be available until after July 10th."

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.02 *Use of Site and Other Areas*

SC-5.02 Add the following new paragraphs immediately after Paragraph 5.02.A.2:

3. The following table lists the dates known to the Owner in which availability of site will be restricted:

Date(s)	Restricted Areas
June 16th – July 2nd, July 5th – July 10th	Middle and West Sections of Park
June 19th, July 3rd – July 4th, July 10th	All of Town Common Park

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Town Common Civic Center and Bulkhead Geotechnical Engineer Report	February 11, 2022	Boring Log, full site, at page 30 Bulkhead Design Parameters, page 13
Town Common Park Bulkhead and Esplanade Geotechnical Engineer Report	May 16, 2024	Slope Stability, Page 16 Soil Bond Stress Values, Page 5

F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
No such drawings	N/A	N/A

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
No such reports	N/A	N/A

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
No such drawings	N/A	N/A

ARTICLE 6—BONDS AND INSURANCE

6.03 *Contractor's Insurance*

Refer to the Instructions to Bidders document include in the bid documents for insurance requirements.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "…all Work at the Site must be performed during regular working hours, all days of the week. Contractor will not perform Work on any legal holiday."

ARTICLE 8—2. OWNER'S EXEMPTION DOES NOT APPLY TO CONSTRUCTION TOOLS, MACHINERY, EQUIPMENT, OR OTHER PROPERTY PURCHASED BY OR LEASED BY CONTRACTOR, OR TO SUPPLIES OR MATERIALS NOT INCORPORATED INTO THE WORKOTHER WORK AT THE SITE

No Supplementary Conditions in this Article.

ARTICLE 9—OWNER'S RESPONSIBILITIES

No Supplementary Conditions in this Article.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

No Supplementary Conditions in this Article.

ARTICLE 11—CHANGES TO THE CONTRACT

No Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No Supplementary Conditions in this Article.

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

No Supplementary Conditions in this Article.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCCEPTANCE OF DEFECTIVE WORK

14.02 *Tests, Inspections, and Approvals*

SC-14.02 Replace Paragraph 14.02.B with the following paragraph:

B. Contractor shall retain and pay for the services of an independent inspector,testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.03 *Substantial Completion*

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

No Supplementary Conditions in this Article.

ARTICLE 18—MISCELLANEOUS

No Supplementary Conditions in this Article.

SPECIFICATION CERTIFICATIONS

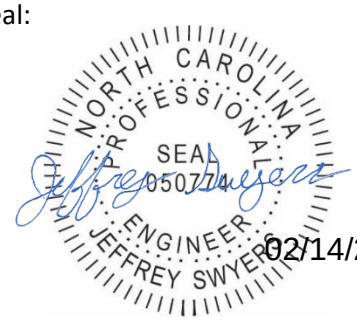
The professional identified below is responsible for performing certain professional services defined in the Contract Documents and is the author of the following Specification Sections for this project:

TECHINCAL SPECIFICATIONS:

00 01 15	M&N	List of Drawings
01 11 00	M&N	Summary of Work
01 14 00	M&N	Work Restrictions
01 33 00	M&N	Submittals
01 45 35	M&N	Special Inspections
02 41 00	M&N	Demolition
03 30 00	M&N	Cast-in-Place Concrete
05 50 13	M&N	Miscellaneous Metal Fabrications
06 13 33	M&N	Timberwork
09 97 13	M&N	Coating of Steel Waterfront Structures
31 46 16	M&N	Metal Sheet Piling
31 62 16	M&N	Steel Pipe Piles
31 62 19	M&N	Timber Marine Piles
31 68 13	M&N	Soil Anchors
35 51 14	M&N	Aluminum Floating Dock for Transient Facility

Firm: Moffatt & Nichol
Name: Jeffrey M. Swyers
Title: Structural Engineer
NC License No.: 050774
NC Firm License No.: F-0105

Seal:



02/14/2025

SPECIFICATION CERTIFICATIONS

The professional identified below is responsible for performing certain professional services defined in the Contract Documents and is the author of the following Specification Sections for this project:

TECHINCAL SPECIFICATIONS:

02 20 00	TEG	Temporary Tree and Plant Protection
32 14 13	TEG	Precast Concrete Unit Pavers
32 31 00	TEG	Woven Wire Fence
32 40 00	TEG	Manufactured Site Furnishings
32 90 00	TEG	Planting & Topsoil
32 92 20	TEG	Fertilizer Seeding Mulch & Sod

Firm: The East Group
Name: Sharon Rhue
Title: Senior Landscape Architect/
Project Manager
NC License No.: 1840
NC Firm License No.: C-427

Seal:

The professional identified below is responsible for performing certain professional services defined in the Contract Documents and is the author of the following Specification Sections for this project:

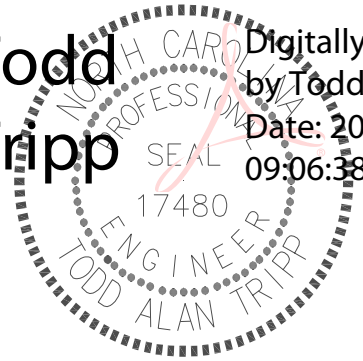
TECHINCAL SPECIFICATIONS:

31 00 00	TEG	Earthwork
31 10 00	TEG	Site Clearing
31 25 00	TEG	Erosion and Pollution Control
31 80 00	TEG	Clean up and Seeding
32 12 00	TEG	Asphalt Paving
32 13 00	TEG	Concrete Pavement
33 10 00	TEG	Water Distribution
33 40 00	TEG	Storm Drainage

Firm: The East Group
Name: Todd A. Tripp
Title: Senior Civil Engineer/
Project Manager
NC License No.: 017480
NC Firm License No.: C-0206

Seal:

Todd Tripp



Digitally signed by Todd Tripp
Date: 2025.02.08 09:06:38 -05'00'

SPECIFICATION CERTIFICATIONS

The professional identified below is responsible for performing certain professional services defined in the Contract Documents and is the author of the following Specification Sections for this project:

TECHINCAL SPECIFICATIONS:

26 20 00	M&N	Electrical Distribution System
26 56 00	M&N	Exterior Lighting

Firm: Moffatt & Nichol
Name: David A. Wills Jr.
Title: Electrical Engineer
NC License No.: 044930
NC Firm License No.: F-0105

Seal:

TECHNICAL SPECIFICATIONS

SECTION 00 01 15 – LIST OF DRAWINGS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Section consists of a listing of Construction Drawings and other related reference drawings and technical information as applicable for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common.

1.2 CONSTRUCTION DRAWINGS

A. Engineering Construction Drawings consisting of **Sheets 1 through 119** specifically prepared for the project entitled **Greenville Town Common & Esplanade Project** are as follows:

General		
1	G-001	Cover Sheet
2	G-002	Index of Drawings
3	G-003	Appendix B – Building Code Summary
4	G-004	General Notes, Abbreviations & Legends
5	G-101	Key Plan
Survey		
6	V-001	Survey Notes & Abbreviations
7	V-101	Existing Site Plan Sheet 1 of 4
8	V-102	Existing Site Plan Sheet 2 of 4
9	V-103	Existing Site Plan Sheet 3 of 4
10	V-104	Existing Site Plan Sheet 4 of 4
Geotechnical		
11	B-101	Boring Location Site Plan
12	B-102	Soil Zone Site Plan
13	B-601	Boring Log Plan Sheet 1 of 2
14	B-602	Boring Log Plan Sheet 2 of 2
Demolition		
15	D-101	Demolition Plan Sheet 1 of 4
16	D-102	Demolition Plan Sheet 2 of 4
17	D-103	Demolition Plan Sheet 3 of 4
18	D-104	Demolition Plan Sheet 4 of 4
19	D-301	Demolition Section Sheet 1 of 3
20	D-302	Demolition Section Sheet 2 of 3

21	D-303	Demolition Section Sheet 3 of 3
22	D-401	Enlarged Demolition Plan
23	D-501	Demolition Details
24	D-901	Demolition Photographs
Civil – General		
25	C-001	Site Plan Notes
26	C-102	Overall Site Plan
Erosion and Sediment Control		
27	CE101	Preliminary Erosion Control Plan
28	CE102	Post-Erosion Control Plan
29	CE301	Erosion Control Details
30	CE302	Turbidity Curtain Detail
31	CE303	Ground Stabilization and Materials Handling
32	CE304	Self-Inspection, Record Keeping and Reporting Notes
Civil – Grading		
33	CG100	Overall Grading & Drainage Plan
34	CG101	Grading & Drainage Plan (West)
34A	CG101A	Grading & Drainage Plan (West) – Alternate A
35	CG102	Grading & Drainage Plan (Center-West)
36	CG103	Grading & Drainage Plan (Center-East)
37	CG104	Grading & Drainage Plan (East)
38	CG301	Site Sections
39	CG302	Site Sections
40	CG303	Site Sections
41	CG401	Grading & Drainage Plan Enlargements
42	CG402	Grading & Drainage Plan Enlargements
43	CG501	Grading Details
Civil – Materials		
44	CS101	Materials & Layout Plan (West)
44A	CS101A	Materials & Layout Plan (West) – Alternate A
45	CS102	Materials & Layout Plan (Center-West)
46	CS103	Materials & Layout Plan (Center-East)
47	CS104	Materials & Layout Plan (East)
48	CS401	Site Plan Enlargement
49	CS402	Site Plan Enlargement

50	CS501	Site Details
51	CS502	Site Details
52	CS503	Site Details
53	CS504	Site Details
54	CS505	Paving Pattern (West)
55	CS506	Paving Pattern (East)
Civil – Utility		
56	CU101	Overall Utility Plan
57	CU501	Utility Details
Landscaping		
58	CL100	Overall Planting Plan
59	CL101	Planting Plan (West)
59A	CL101A	Planting Plan (West) Additive Bid #2
60	CL102	Planting Plan (Center-West)
61	CL103	Planting Plan (Center-East)
62	CL104	Planting Plan (East)
63	CL501	Planting Details, Notes, and Schedule
63A	CL501a	Planting Details, Notes, and Schedule Additive Bid #2
Structural		
64	S-001	Structural Notes
65	SB101	Pile Plan Sheet 1 of 4 Base Bid
65A	SB101A	Pile Plan Sheet 1 of 4 Additive Bid #3
66	SB102	Pile Plan Sheet 2 of 4 Base Bid
67	SB103	Pile Plan Sheet 3 of 4 Base Bid
68	SB104	Pile Plan Sheet 4 of 4 Base Bid
69	ST101	Deck Plan Sheet 1 of 4 Base Bid
69A	ST101A	Deck Plan Sheet 1 of 4 Additive Bid #3
70	ST102	Deck Plan Sheet 2 of 4 Base Bid
71	ST103	Deck Plan Sheet 3 of 4 Base Bid
72	ST104	Deck Plan Sheet 4 of 4 Base Bid
73	S-301	Typical Section 1 of 6
74	S-302	Typical Section 2 of 6
75	S-303	Typical Section 3 of 6
76	S-304	Typical Section 4 of 6
77	S-305	Typical Section 5 of 6

78	S-305	Typical Section 6 of 6
79	S-401	Enlarged Bulkhead Connections
80	S-402	Boardwalk Enlarged Pile Plan Sheet 1 of 2
81	S-403	Boardwalk Enlarged Pile Plan Sheet 2 of 2
82	S-404	Boardwalk Enlarged Framing Plan Sheet 1 of 2
83	S-405	Boardwalk Enlarged Framing Plan Sheet 2 of 2
84	S-406	Boardwalk Enlarged Deck Plan Sheet 1 of 2
85	S-407	Boardwalk Enlarged Deck Plan Sheet 2 of 2
86	S-408	Bulkhead Retaining Wall Details
87	S-409	Floating Dock Enlarged Plan Additive Bid #1
88	S-410	Timber Bridge Enlarged Plan & Elevation Additive Bid #3
89	S-411	Overlook Enlarged Plan & Elevation Additive Bid #3
90	S-501	Timber Walkway Details 1 of 5
91	S-502	Timber Walkway Details 2 of 5
92	S-503	Timber Walkway Details 3 of 5
93	S-504	Timber Walkway Details 4 of 5
94	S-505	Timber Walkway Details 5 of 5
95	S-506	Drain Pipe Extension Details
96	S-507	Soil Anchor Details
97	S-508	Retaining Wall Details
98	S-509	Concrete Details
99	S-510	Miscellaneous Details
100	S-511	Stiff Arm Details Additive Bid #1
101	S-512	Floating Dock Detail Additive Bid #1
102	S-513	Debris Deflector Detail Additive Bid #1
103	S-514	Gangway Details Additive Bid #1
104	S-601	Soil Anchor Schedule
105	S-602	Pile Schedule
Electrical		
106	E-001	Electrical Notes, Legend & Abbreviations
107	E-101	Electrical Plan 1 of 4 Base Bid
107A	E-101A	Electrical Plan 1 of 4 Additive Bid #2
107B	E-101B	Electrical Plan 1 of 4 Additive Bid #3
108	E-102	Electrical Plan 2 of 4
109	E-103	Electrical Plan 3 of 4

110	E-104	Electrical Plan 4 of 4
111	E-501	Electrical Details 1 of 3 Base Bid
112	E-502	Electrical Details 2 of 3 Base Bid
112A	E-502A	Electrical Details 2 of 3 Additive Bid #2
113	E-503	Electrical Details 3 of 3 Base Bid
114	E-601	Single Line Diagrams & Schedules
115	E-602	Electrical Schedules
Reference		
116	SU1	Location Survey
117	SU2	Location Survey
118	SU3	Topographic Survey
119	SU4	Topographic Survey

1.3 REFERENCE INFORMATION

A. Record Drawings: Information used in developing the Engineering Construction Drawings for this project was obtained from the following Reference Drawing that were made available to the Designer by the Owner. The listing of Reference Drawings is provided for Contractor's information only and is intended to illustrate where details of the existing structure construction were derived. The existing Reference Drawings are the property of the City and shall not be used for any purpose other than that intended by the Contract. Reference drawings are provided as an Appendix "A" to the specifications.

Shore Drive Project Details for Retaining Wall, Esplanade, Etc.
Sheets 2, 9, 11
Rivers and Associates, Inc.
As-Built Drawings Dated August 11, 1967

B. Project Subsurface Investigation: A geotechnical investigation completed as a part of this project was performed by the following. The Geotechnical Engineer of Record (GEOR) is Andrew J Gliniak (North Carolina License No. 042183). The geotechnical "Report of Subsurface Investigation" can be found in Appendix "B" of these Specifications. Soil boring information is provided for Contractor's information only. The City makes no representations about subsurface conditions that may be encountered within the limits of the project. Soil borings represent subsurface information only at the location of the boring and is not intended to be considered typical beyond the limits of the boring. The Contractor should anticipate variability in the subsurface conditions and allow for variation in the bid preparation.

Town Common Civic Center and Bulkhead Geotechnical Engineer Report
Sheets 1 through 50
Terracon Consultants, Inc.

Report Dated February 11, 2022

Town Common Park Bulkhead and Esplanade Geotechnical Engineer Report
Sheets 1 through 25
Terracon Consultants, Inc.
Report Dated May 16, 2024

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 00 01 15

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Section summarizes the Scope of Work for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The project site is located on the south side of the Tar River at Town Common Park, in the city of Greenville, North Carolina.

1.2 REFERENCES

A. Documents related to this Section consist of the Project Drawings and Specifications, including but not limited to: Advertisement for Bids; Instructions to Bidders; General Conditions of the Contract; Supplementary General Conditions; Technical Specifications; Form of Proposal; Form of Construction Contract; Form of Performance Bond; Form of Payment Bond.

1.3 WORK COVERED BY THE CONTRACT DOCUMENTS

A. Project Description: The scope of this project includes furnishing all materials, labor, equipment, utilities, and incidental items necessary to perform all of the work associated with the **Greenville Town Common & Esplanade Project** project at the City of Greenville, Town Common Park as indicated on the project drawings and specified herein. The work will include, but is not limited to, the following items:

1. Phased partial demolition and construction at the existing bulkhead.

2. Select demolition of existing asphalt pavement, concrete promenade, and brick retaining wall south of the existing bulkhead.

3. Installation of new steel sheet pile bulkhead with soil anchors to the north of the existing bulkhead.

4. Installation of a new cast-in-place retaining walls and concrete promenade.

5. Construction of new timber boardwalk with timber framing.

6. Installation of a timber decked overlook platform that is supported by steel pipe piles and steel framing along with a timber boardwalk and bridge at the west end of the park.

7. Installation of floating dock and gangway along with a debris deflector upstream of the new floating dock.

8. Installation of an at-grade nature trail walkway at the west end of the park.

1.4 GENERAL CONSTRUCTION CONTRACT

A. General Construction Contract Base Bid: The work associated with this item includes furnishing all materials, labor, equipment, utilities, and incidental items, necessary for the completion of the Base Bid project as shown on the Contract Drawings and contained within these Specifications. The unit price/ extended total submitted for this item shall include, but is not limited to, all applicable features indicated in the previous Paragraph "PROJECT DESCRIPTION".

1.5 GENERAL CONSTRUCTION CONTRACT – ADDITIVE BID NO. 1:

A. The following unit price/extended total General Construction Contract – Additive Bid No. 1 items for this project are listed in the Form of Proposal (located in Section B of these Specifications) and are to be completed by the Contractor during bid preparation. The work associated with this item includes furnishing all materials, labor, equipment, utilities, and incidental items, necessary for the completion of the Additive Bid No. 1 project as shown on the Contract Drawings and contained within these Specifications. The unit price/ extended total submitted for this item shall include, but is not limited to, all applicable features indicated in the previous Paragraph "PROJECT DESCRIPTION".

1.6 GENERAL CONSTRUCTION CONTRACT – ADDITIVE BID NO. 2:

A. The following unit price/extended total General Construction Contract – Additive Bid No. 2 items for this project are listed in the Form of Proposal (located in Section B of these Specifications) and are to be completed by the Contractor during bid preparation. The work associated with this item includes furnishing all materials, labor, equipment, utilities, and incidental items, necessary for the completion of the Additive Bid No. 3 project as shown on the Contract Drawings and contained within these Specifications. The unit price/ extended total submitted for this item shall include, but is not limited to, all applicable features indicated in the previous Paragraph "PROJECT DESCRIPTION".

1.7 GENERAL CONSTRUCTION CONTRACT – ADDITIVE BID NO. 3:

A. The following unit price/extended total General Construction Contract – Additive Bid No. 2 items for this project are listed in the Form of Proposal (located in Section B of these Specifications) and are to be completed by the Contractor during bid preparation. The work associated with this item includes furnishing all materials, labor, equipment, utilities, and incidental items, necessary for the completion of the Additive Bid No. 2 project as shown on the Contract Drawings and contained within these Specifications. The unit price/ extended total submitted for this item shall include, but is not limited to, all applicable features indicated in the previous Paragraph "PROJECT DESCRIPTION".

1.8 GENERAL CONSTRUCTION CONTRACT – ADDITIVE BID NO. 4:

A. The following unit price/extended total General Construction Contract – Additive Bid No. 4 items for this project are listed in the Form of Proposal (located in Section B of these

Specifications) and are to be completed by the Contractor during bid preparation. The work associated with this item includes furnishing all materials, labor, equipment, utilities, and incidental items, necessary for the completion of the Additive Bid No. 4 project as shown on the Contract Drawings and contained within these Specifications. The unit price/ extended total submitted for this item shall include, but is not limited to, all applicable features indicated in the previous Paragraph "PROJECT DESCRIPTION".

1.9 BASIS OF AWARD

A. The award of the contract will be based on an Owner selected combination of the Base Bid and any applicable Bid Alternates.

1.10 UNIT PRICES

A. If applicable, project Unit Price Items are listed in the Form of Proposal (located in Section B of these Specifications) and are to be completed by the Contractor during bid preparation. The purpose of the Unit Price Items is to establish select unit price breakdowns during the bidding phase that may be used to assess changes in the scope of work in accordance with the Contract Documents. All Contractor general construction costs, including, but not limited to, overhead and profit required to install the select item indicated should be included in the unit price provided.

1. General Conditions: This per day value should include all general expenses required to construct the project on site (i.e. construction trailer rental, restroom rental, miscellaneous equipment rental, field office administrative costs, etc.). If required, the unit price provided by the selected Contractor on the Form of Proposal could be used by the City to assess project costs should the contract duration be extended due to approved change orders. Therefore, the unit price submitted for this item shall include the Contractor's costs for all General Conditions related activities associated with the construction contract for the stated time of completion.

2. Concrete Demolition: This per cubic yard value should include all expenses required for the demolition of existing concrete typical of what is shown in the project drawings.

3. Steel Sheet Pile Demolition: This per square yard value should include all expenses required for the demolition of existing steel sheet piles typical of what is shown in the project drawings.

4. Fill Removal, Storage, and Grading: This per cubic yard value should include all expenses required for removal, storage, and re-grading of existing grade typical of what is shown in the project drawings.

5. Steel Pipe Pile Installation: The per pile value should include all expenses required for materials and installation of new 12" diameter steel pipe piles, including but not limited to pile shoes, pile driving, pile cutoff (if required), typical of what is shown in the project drawings.

6. Cast-in-Place Concrete Cap Construction: This per cubic yard value should include all expenses required for construction of new cast-in-place concrete bulkhead cap typical of what is shown in the project drawings.

7. Cast-in-Place Concrete Retaining Wall Construction: This per cubic yard value should include all expenses required for construction of new cast-in-place concrete retaining wall typical of what is shown in the project drawings.

8. Steel Sheet Pile Construction: This per ton value should include all expenses required for construction of the new steel sheet piling typical of what is shown in the project drawings.

9. Soil Anchor Construction: This per linear foot value should include all expenses required for construction of the new soil anchors typical of what is shown in the project drawings.

10. Timber Boardwalk Construction: This linear foot value should include all expenses required for construction of the new 6ft timber boardwalk typical of what is shown in the project drawings.

11. Select Fill, Geotextile, and Grading: This per square yard value should include all expense required for placement, geotextile reinforcing, and re-grading typical of what is shown in the project drawings

1.11 EXISTING WORK

A. Protect existing structures, equipment, utilities, and improvements in conformance with the following.

B. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

C. Repair or replace portions of existing work, which have been altered during demolition and construction operations to match existing or adjoining work, as approved by the Owner's Representative. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.12 OWNER FURNISHED MATERIAL

A. The Contractor shall note that no project related materials will be provided by the Owner for installation by the Contractor.

1.13 GENERAL

A. The scope of this project consists of, but is not limited to, furnishing all materials, labor, equipment, utilities, and incidental items necessary to perform all of the work associated

with the **Greenville Town Common & Esplanade Project** project **( )** at the City of Greenville (City) Town Common Park as indicated on the project drawings and specified herein. All items on the project drawings, but not in the specifications, or items in the specifications, and not on the project drawings shall be considered included in the scope of work. The project drawings and specifications are not necessarily complete in every detail. The Contractor shall provide for complete demolition and construction; including work reasonably inferred from the Contract Documents as being necessary to produce the intended results, whether indicated or not in the project drawings or specifications. Unless otherwise noted within the Contract Documents, the Contractor shall make complete submittal of all shop drawings, proposed systems and equipment; including cut sheets and technical information; calculations; and other information requested, to the Designer. Submittal of information shall be in a timely manner prior to commencement of work on the system represented by the submittal.

1.14 PERMIT REQUIREMENTS

A. The contractor must ensure compliance with all permit requirements outlined in Appendix B

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 01 11 00

SECTION 01 14 00 – WORK RESTRICTIONS

PART 1 - GENERAL

1.1 COOPERATION AND COORDINATION WITH CITY OF GREENVILLE OPERATIONS

A. Adjacent areas will be in use during this Contract requiring that the Contractor closely coordinate his work with the Owner to minimize interference with the Operations and other contractors performing work on behalf of the City of Greenville (City). The Contractor shall coordinate with the City to obtain access to the site and provide a minimum agreed advance notice before accessing the work area and requesting any utility outages.

B. The Contractor is responsible for the coordination and protection of his work until acceptance by the Owner.

C. The Contractor shall submit a timeline that shows all work to be performed and the areas of the Town Common Park that will be affected during each phase of the construction. The Contractor must present this timeline to the Owner for approval prior to the commencement of any work. Any deviations from the approved timeline shall be promptly brought to the attention of the Owner.

1.2 CONSTRUCTION AREA

A. The Contractor shall provide lights, barricades and warning signs as necessary to protect the required construction area. The Contractor shall coordinate with the Owner's Representative, the area required for construction purposes. An area for the Contractor's field office and/or material storage shall be coordinated with the Owner.

1.3 SAFETY

A. The Contractor shall assign a safety officer to the project for its duration. At a minimum, the safety officer shall be physically present at the project site for the complete time period from the commencement of the work through commissioning, certifications and placement into the City operations. The safety officer is allowed to have other duties during construction but should be authorized by the Contractor to stop work or take necessary actions to ensure safe working conditions. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work.

B. The project site is a public access park. The Contractor shall provide barrier, fencing, signs, and other safety measures as necessary to prevent the public from entering the work area or any location that may be hazardous to the public throughout the duration of the project. The Contractor shall include all costs associated with protection measures in the Base Bid.

1.4 OTHER CONTRACTS AND OWNER'S OPERATIONS

A. The Owner or other Contractors may have operations underway at or near the site of work under this Contract. The Contractor shall fully cooperate with the Owner's work forces or the work forces of other Contractors and shall adapt his scheduling and performance of the work under this Contract to accommodate the other work and shall heed any direction that may be provided by the Owner. The Contractor shall not commit, nor permit, any act that will interfere with the performance of work by other Contractors or by the Owner.

1.5 UTILITIES

A. The Contractor will be responsible for furnishing, at his own expense, all necessary potable water and electrical power, including utility connections. Metered connections to City potable water utilities may be available upon request.

1.6 EXISTING WORK

A. The Contractor shall protect existing work which is to remain in place, be reused, or remain the property of the Owner. Repair items which are to remain and which are damaged during performance of the work to their original condition.

1.7 USE OF SITE

A. The Contractor's use of the site may be restricted. Work hours may be limited.

1.8 LAYDOWN AREA

A. The designated laydown area for the project is limited to the area shown in **FIGURE 1-1**.

FIGURE 1-1: LAYDOWN AREA

B. Any damage to the laydown area and its surroundings during the construction period shall be repaired by the contractor at not additional cost to the owner.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 01 14 00

SECTION 01 33 00 – SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The Contractor shall furnish to the Owner's Representative electronic copies of submittals as required by Specification Sections for this project.

1.2 ACCEPTANCE REQUEST

A. A "CONTRACT ITEM ACCEPTANCE REQUEST" form shall accompany all submittals to the Designer. All items shall be individually listed and clearly identified, referencing the applicable Specification Section and Paragraph. A copy of this form is located at the end of this Section and may be reproduced as needed.

B. Individual Acceptance Request: Up to eight (8) items may be listed on a Contract Item Acceptance Request. Number each Contract Item Acceptance Request consecutively (Submittal #1, #2, etc.) and re-submittals with letters (Submittal #1A is the first re-submittal of Submittal #1).

C. Submittals: The Contractor shall review, approve, and forward directly to the Owner's Representative, all required submittals. All submittals shall bear the Contractor's stamp of approval. Any exceptions to the Contract Documents shall be noted on the Contract Item Acceptance Request form. The Contractor shall allow twenty (20) calendar days, from the date of receipt by the Owner's Representative (excluding mailing time), for the review process in the Construction Schedule and all project planning. In instances where submittal review must be expedited, the Contractor may annotate the Contract Item Acceptance Request as "Urgent". The Owner's Representative will make every effort to accelerate the review of each urgent submittal; however, the Contractor should not anticipate a reduced time schedule and shall plan project progress accordingly.

1.3 ACCEPTANCE

A. After Owner's Representative review, individual submittals will be stamped with one of the following directives. Instructions for each submittal item will also be indicated on the Contract Item Acceptance Request form. Upon completion of the submittal review process one (1) copy will be retained by the Reviewer, one (1) copy will be forwarded to the Owner, and the remaining copies of the submittal will be returned for the Contractor's use as noted.

   a. "No Exceptions Taken" (NET) (Submittal is approved and no further action is required)

   b. "Make Corrections Noted" (MCN) (Submittal is approved pending incorporation of noted corrections, re-submittal is not required)

c. "Revise and Resubmit" (R&R)

d. "Rejected" (R)

e. "Submit Specified Item" (SSI)

f. "Review not Required as Noted" (RNR)

B. Re-Submittal: Prompt re-submittal of noted items is required. The Contractor shall furnish a new Contract Item Acceptance Request numbered in accordance with the requirements of the previous Paragraph "INDIVIDUAL ACCEPTANCE REQUEST". When re-submittals are required, the submittal procedure shall be the same as for original submittals.

1.4 DEFECTIVE WORK

A. Review of submittals by the Owner's Representative is for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications and does not authorize changes involving costs unless covered by approved change order. Review does not cover assemblies of which items being reviewed are components. Contractor is responsible for: dimensions, quantities, and details which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of work with that of all other trades; safety precautions; and the satisfactory performance of work.

B. Approval of submittals by the Owner's Representative shall not be construed as relieving the Contractor from responsibility for compliance with the design or terms of the Contract Documents nor from responsibility of errors of any sort, unless such lack of compliance or errors have first been called in writing to the attention of the Owner's Representative by the Contractor.

C. Acceptance of submittals does not restrict the Owner's right to reject: departures from contract requirements; use of damaged or improperly installed items/materials; or latent defects; nor does it prejudice the Owner's rights of rejecting any work found defective at Final Inspection and Acceptance.

D. Work Prior to Submittal: Work started or completed prior to submittal acceptance by the Owner's Representative is solely at the Contractor's risk and may jeopardize contract performance.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION– NOT USED

END OF SECTION 01 33 00

CONTRACT ITEM ACCEPTANCE REQUEST

CONTRACTOR: _____

PROJECT NAME: **Greenville Town Common & Esplanade Project**

PROJECT LOCATION: **Greenville, North Carolina**

City Contract No.: _____

SUBMITTAL No.: _____

SUBMITTAL DATE: _____

URGENT: YES NO

NOTE: Contractor must mark Deviation column if submittal deviates from Contract requirements.

Item No.	Specification Section and Paragraph	Description of Item(s) Submitted (Include Type, Model No., Manufacturer, Etc.)	Deviation	Status

COMMENTS:

Name & Title	Signature	Date

NOTE: Review and acceptance of submittals is intended to verify general conformance with the design intent as shown on the project drawings and in the specifications. Acceptance by the Designer does not relieve the Contractor of responsibility for any errors and/or omissions in the submittals, nor from the responsibility for complying with the requirements of the Contract Documents.

SECTION 01 45 35 – SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of requirements for special inspections for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common Terminal.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Society of Civil Engineers (ASCE)

ASCE 7-16	Minimum Design Loads and Associated Criteria for Buildings and Other Structures

C. International Code Council (ICC)

ICC IBC	(2015) International Building Code

D. U.S. Department of Defense (DOD)

UFC 3-301-01	Structural Engineering

1.3 GENERAL REQUIREMENTS

A. Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections and Chapter 17 of ICC IBC. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections are to be performed by an independent third party and are intended to ensure that the work of the Prime Contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.

1.4 DEFINITIONS

A. Continuous Special Inspections: Continuous Special Inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks.

B. Perform: Perform these Special Inspections tasks for each welded joint or member.

C. Observe: Observe these Special Inspections items on a periodic daily basis. Operations need not be delayed pending these inspections.

D. Special Inspector (SI): A qualified person retained by the Contractor and having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Contractor.

E. Associate Special Inspector (ASI): A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.

F. Third Party: A Special inspector must not be an employee of the Contractor or of any Sub-Contractor performing the work to be inspected.

G. Contractor's Quality Control (QC) Manager: An individual retained by the Prime Contractor and qualified, having the overall responsibility for the Contractor's QC organization.

H. Structural Engineer of Record (SER): A registered design professional contracted by the Owner as an A/E responsible for the overall design and review of submittal documents prepared by others. The SER is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in the state in which the design professional works. The SER is also referred to as the Engineer of Record (EOR) in design code documents.

I. Statement of Special Inspections (SSI): A document developed by the SER identifying the material, systems, components and work required to have Special Inspections. This statement is included at the end of this specification.

J. Schedule of Special Inspections (SSI): A schedule which lists each of the required Special Inspections, the extent to which each Special Inspection is to be performed, and the required frequency for each in accordance with ICC IBC Chapter 17. This schedule is included at the end of this specification.

1.5 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Owner’s Representative shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Closeout Submittals

1. Comprehensive Final Report of Special Inspections

1.6 SPECIAL INSPECTOR QUALIFICATIONS

A. Submit qualifications for each special inspector and the special inspector of record.

B. Steel Construction and High Strength Bolting

1. Special Inspector

a. ICC Structural Steel and Bolting Special Inspector certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

2. Associate Special Inspector

a. Engineer-In-Training with one year of related experience.

C. Welding Structural Steel

1. Special Inspector

a. ICC Structural Welding Special Inspector certificate with one year of related experience, or

b. AWS Certified Welding Inspector

2. Associate Special Inspector

a. AWS Certified Associate Welding Inspector

D. Nondestructive Testing of Welds

1. Special Inspector

a. NDT Level III Certificate

2. Associate Special Inspector

a. NDT Level II Certificate plus one year of related experience

E. Concrete Construction

1. Special Inspector

a. ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or

b. ACI Concrete Construction Special Inspector, or

c. Registered Professional Engineer with three years of related experience

2. Associate Special Inspector

a. ACI Concrete Construction Special Inspector in Training, or

b. Engineer-In-Training with one year of related experience

F. Verification of Site Soil Condition, Fill Placement and Load-Bearing Requirements

1. Special Inspector

a. ICC Soils Special Inspector Certificate with one year of related experience, or

b. NICET Soils Technician Level II Certificate in Construction Material Testing, or

c. Geologist-In-Training with three years of related experience, or

d. Registered Professional Engineer with three years of related experience

2. Associate Special Inspector

a. NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or

b. Engineer-In-Training with one year of related experience

G. Deep Foundations

1. Special Inspector

a. NICET Soils Technician Level II Certificate in Construction Material Testing, or

b. Geologist-In-Training with three years of related experience, or

c. Registered Professional Engineer with three years of related experience

2. Associate Special Inspector

a. NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or

b. NICET Geotechnical Engineering Technician Level I Construction or Generalist Certificate with one year of related experience, or

c. Engineer-In-Training with one year of related experience

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 RESPONSIBILITIES

A. Quality Control Manager

1. Verify the qualifications of fabricators.

2. Maintain a 3-ring binder or digital log for the Special Inspector's daily and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Owner's Representative and the SER.

3. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.

B. Special Inspectors

1. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections.

2. Submit a copy of the weekly reports to the QC Manager.

3. Report discrepancies that are observed during Special Inspections to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report.

4. Submit a biweekly Special Inspection Report until all inspections are complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following:

   a. A brief summary of the work performed during the reporting time frame.

   b. Changes and discrepancies with the drawings, specifications that were observed during the reporting period.

   c. Discrepancies which were resolved or corrected.

   d. A list of nonconforming items requiring resolution.

   e. All applicable test result including nondestructive testing reports.

5. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project and

corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.

3.2 DEFECTIVE WORK

A. Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Owner's Representative to accept such work.

B. The Contractor shall pay for all additional tests required when failing or defective work is encountered after initial testing.

END OF SECTION 01 45 35

Project: Greenville Town Common & Esplanade Project
Location: Greenville, NC
Date: 2/14/2025

STATEMENT OF SPECIAL INSPECTIONS

Project Seismic Design Category: B
Project Risk Category: II
Project Design Wind Speed (mph): 129
Number of Stories: 1
Structure Height Above Grade (ft): 15
Hazardous Occupancy or attached to such? No Group H Occupancies

Special Inspector of Record (SIOR)

A Special Inspector of Record (SIOR) **IS NOT** required (per UFGS 01 45 35, Section 1.3.8)

Lateral Force Resisting System (LFRS)

2018 IBC 1704.3.2 and 1704.3.3

Following is a listing of critical main wind/seismic force resisting systems for this structure. Carefully inspect these elements as part of the roles and responsiblities of the Special Inspector (reference the Schedule of Special Inspections for inspection checklists).

Vertical LFRS Elements	Notes

Horizontal LFRS Elements	Notes

Project: Greenville Town Common & Esplanade Project
Location: Greenville, NC
Date: 2/14/2025

Designated Seismic Systems (DSS)

(2018 IBC 1705.13.3) (ASCE 7-16, 13.2.2, C13.2.2) (UFC 3-301-1, 2-5.3)

DESIGNATED SEISMIC SYSTEMS DO NOT APPLY TO THIS PROJECT, due to the Seismic Design Category being less than C.

ELECTRICAL Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

MECHANICAL/PLUMBING Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

If additional space is required, append an additional sheet listing the remaining DSS

OTHER Designated Seismic Systems (DSS) Requiring a Certificate of Compliance
N/A
N/A
N/A
N/A
N/A
N/A

Final Walk Down Inspection and Report

(UFC 3 301 01 SECTION 2-5.4)

Final Walk Down Inspection of non-structural Designated Seismic Systems does not apply to this project (no Designated Seismic Systems)

SCHEDULE OF SPECIAL INSPECTIONS

Reference Specification Section 01 45 35 for all requirements not noted as part of this schedule.

INSPECTION DEFINITIONS:

PERFORM: Perform these tasks for each weld, fastener or bolted connection, and noted verification.

OBSERVE: Observe these items randomly during the course of each work day to insure that applicable requirements are being met. Operations need not be delayed pending these inspections at contractor's risk.

DOCUMENT: Document, with a report, that the work has been performed in accordance with the contract documents. This is in addition to any other reports required in the Special Inspections guide specification.

CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

The Seismic Design Category for this project is: ☐ A, ☒ B, ☐ C, ☐ D, ☐ E, ☐ F (check appropriate box)

STRUCTURAL - STEEL – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION PRIOR TO WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-1		
TASK	INSPECTION TYPE[1]	DESCRIPTION
1. Verify that the welding procedures specification (WPS) is available	**PERFORM**	
2. Verify manufacturer certifications for welding consumables are available	**PERFORM**	
3. Verify material identification	**PERFORM**	Type and grade.
4. Welder Identification System	**PERFORM**	The fabricator or erector, as applicable, shall maintain a system by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress type.
5. Fit-up of groove welds (including joint geometry)	OBSERVE	✓ Joint preparation ✓ Dimensions (alignment, root opening, root face, bevel) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location) ✓ Backing type and fit (if applicable)
6. Configuration and finish of access holes	OBSERVE	
7. Fit-up of fillet welds	OBSERVE	✓ Dimensions (alignment, gaps at root) ✓ Cleanliness (condition of steel surfaces) ✓ Tacking (tack weld quality and location)
STEEL INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-2		
TASK	INSPECTION TYPE	DESCRIPTION
8. Use of qualified welders	**PERFORM**	Welding by welders, welding operators, and tack welders who are qualified in conformance with requirements.
9. Control and handling of welding consumables	OBSERVE	✓ Packaging ✓ Electrode atmospheric exposure control
10. No welding over cracked tack welds	OBSERVE	
11. Environmental conditions	OBSERVE	✓ Wind speed within limits ✓ Precipitation and temperature
12. Welding Procedures Specification followed	OBSERVE	✓ Settings on welding equipment ✓ Travel speed ✓ Selected welding materials ✓ Shielding gas type/flow rate ✓ Preheat applied ✓ Interpass temperature maintained (min./max.) ✓ Proper position (F, V, H, OH) ✓ Intermix of filler metals avoided
13. Welding techniques	OBSERVE	✓ Interpass and final cleaning ✓ Each pass within profile limitations ✓ Each pass meets quality requirements

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

STRUCTURAL - STEEL – WELDING SECTION (CONTINUED)

STEEL INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.4-3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
14. Welds cleaned	OBSERVE	
15. Size, length, and location of all welds	**PERFORM**	Size, length, and location of all welds conform to the requirements of the detail drawings.
16. Welds meet visual acceptance criteria	**PERFORM AND DOCUMENT**	✓ Crack prohibition ✓ Weld/base-metal fusion ✓ Crater cross section ✓ Weld profiles ✓ Weld size ✓ Undercut ✓ Porosity
17. Arc strikes	**PERFORM**	
18. k-area	**PERFORM**	When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks.
19. Backing removed, weld tabs removed and finished, and fillet welds added where required	**PERFORM**	
20. Repair activities	**PERFORM AND DOCUMENT**	
21. Document acceptance or rejection of welded joint or member	**PERFORM**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL – BOLTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

STEEL INSPECTION TASKS PRIOR TO BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-1		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Manufacture's certifications available for fastener materials	**PERFORM**	
2. Fasteners marked in accordance with ASTM requirements	OBSERVE	
3. Proper fasteners selected for joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	OBSERVE	
4. Proper bolting procedure selected for joint detail	OBSERVE	
5. Connecting elements, including appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	OBSERVE	
6. Proper storage provided for bolts, nuts, washers, and other fastener components	OBSERVE	
STEEL INSPECTION TASKS DURING BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table C-N5.6-2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
7. Fastener assemblies of suitable condition, placed in all holes and washers (if required) are positioned as required	OBSERVE	
8. Joint brought to the snug-tight condition prior to pretensioning operation	OBSERVE	
9. Fastener component not turned by the wrench prevented from rotating	OBSERVE	
10. Bolts are pretensioned in accordance with RCSC Specification, progressing systematically from the most rigid point toward the free edges	OBSERVE	
STEEL INSPECTION TASKS AFTER BOLTING – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.1, AISC 360-10: Table C-N5.6-3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Document acceptance or rejection of all bolted connections	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL - NON DESTRUCTIVE TESTING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Section N5.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Use of qualified nondestructive testing personnel	**PERFORM**	Visual weld inspection and nondestructive testing (NDT) shall be conducted by personnel qualified in accordance with AWS D1.8 clause 7.2
2. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 20% of CJP groove welds for materials greater than 5/16" (8mm) thick. Testing rate must be increased to 100% if greater than 5% of welds tested have unacceptable defects.
3. Welded joints subject to fatigue	OBSERVE	Dye penetrant testing (DT) and Ultrasonic testing (UT) shall be performed on 100% of welded joints identified on contract drawings as being subject to fatigue.
4. Weld tab removal sites	OBSERVE	At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

STRUCTURAL - STEEL – AISC 341 REQUIREMENTS (SEISMIC PROVISIONS) SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

NONDESTRUCTIVE TESTING OF WELDED JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Section J6.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
5. CJP groove welds	OBSERVE	Dye penetrant testing (DT) and ultrasonic testing (UT) shall be performed on 100% of CJP groove welds for materials greater than 5/16" thick (8mm).
6. Beam cope and access hole.	OBSERVE	At welded splices and connections, thermally cut surfaces of beam copes and access holes shall be tested using magnetic particle testing (MT) or dye penetrant testing (DT), when the flange thickness exceeds 1 1/2 in. for rolled shapes, or when the web thickness exceeds 1 1/2 in. for built-up shapes.
7. K-area NDT (AISC 341)	**PERFORM**	Where welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3-inches of the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.
8. Placement of reinforcing or contouring fillet welds	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - STEEL - COMPOSITE CONSTRUCTION [1]

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

COMPOSITE CONSTRUCTION PRIOR TO PLACING CONCRETE – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 360-16: Table N6.1, AISC 341-16: Table J9.1		
TASK	INSPECTION TYPE [2]	DESCRIPTION
1. Placement and installation of steel headed stud anchors	**PERFORM**	
2. Material identification of reinforcing steel (Type/Grade)	OBSERVE	
3. Determination of carbon equivalent for reinforcing steel other than ASTM A706	OBSERVE	
4. Proper reinforcing steel size, spacing, clearances, support, and orientation	OBSERVE	
5. Reinforcing steel has not been re-bent in the field	OBSERVE	
6. Reinforcing clearances have been provided	OBSERVE	
7. Reinforcing steel has been tied and supported as required	OBSERVE	
8. Composite member has required size	OBSERVE	

END SECTION

STRUCTURAL - STEEL - OTHER INSPECTIONS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

OTHER STEEL INSPECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.2.1, AISC 341-16: Tables J8.1 & J10.1		
TASK	INSPECTION TYPE [2]	DESCRIPTION
1. Anchor rods and other embedments supporting structural steel	**PERFORM**	Verify the diameter, grade, type, and length of the anchor rod or embedded item, and the extent or depth of embedment prior to placement of concrete.
2. Fabricated steel or erected steel frame	OBSERVE	Verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.
3. Reduced beam sections (RBS) where/if occurs	**DOCUMENT**	✓ Contour and finish ✓ Dimensional tolerances
4. Protected zones	**DOCUMENT**	No holes or unapproved attachments made by fabricator or erector
5. H-piles where/if occurs	**DOCUMENT**	No holes or unapproved attachments made by the responsible contractor

END SECTION

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[1] See Concrete Construction Section for all concrete related inspection of composite steel construction.

[2] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - COLD-FORMED METAL DECK - PLACEMENT SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION PRIOR TO DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.1		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness	**PERFORM**	
2. Document acceptance or rejection of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION DURING DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
3. Verify compliance of deck and all deck accessories installation with construction documents	**PERFORM**	
4. Verify deck materials are represented by the mill certifications that comply with the construction documents	**PERFORM**	
5. Document acceptance or rejection of installation of deck and deck accessories	**DOCUMENT**	
METAL DECK INSPECTION AFTER DECK PLACEMENT – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
6. Welding procedure specification (WPS) available	**PERFORM**	
7. Manufactures certifications for welding consumables available	OBSERVE	
8. Material identification (type/grade)	OBSERVE	
9. Check welding equipment	OBSERVE	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - COLD-FORMED METAL DECK – WELDING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION DURING WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.4		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Use of qualified welders	OBSERVE	
2. Control and handling of welding consumables	OBSERVE	
3. Environmental conditions (wind speed, moisture, temperature)	OBSERVE	
4. WPS followed	OBSERVE	
METAL DECK INSPECTION AFTER WELDING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
5. Verify size and location of welds, including support, sidelap, and perimeter welds.	**PERFORM**	
6. Welds meet visual acceptance criteria	**PERFORM**	
7. Verify repair activities	**PERFORM**	
8. Document acceptance or rejection of welds	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - COLD-FORMED METAL DECK – FASTENING SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

METAL DECK INSPECTION BEFORE MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Manufacturer installation instructions available for mechanical fasteners	OBSERVE	
2. Proper tools available for fastener installation	OBSERVE	
METAL DECK INSPECTION DURING MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
3. Fasteners are positioned as required	OBSERVE	
4. Fasteners are installed in accordance with manufacturer's instructions	OBSERVE	
METAL DECK INSPECTION AFTER MECHANICAL FASTENING – VERIFY THE FOLLOWING ARE IN COMPLIANCE SDI QA/QC-2011, Appendix 1, Table 1.8		
TASK	INSPECTION TYPE [1]	DESCRIPTION
5. Check spacing, type, and installation of support fasteners	**PERFORM**	
6. Check spacing, type, and installation of sidelap fasteners	**PERFORM**	
7. Check spacing, type, and installation of perimeter fasteners	**PERFORM**	
8. Verify repair activities	**PERFORM**	
9. Document acceptance or rejection of mechanical fasteners	**DOCUMENT**	

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.

STRUCTURAL - LIGHT GAUGE STEEL FRAMING AND/OR LIGHT GAUGE TRUSSES SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

LIGHT GAUGE STEEL CONSTRUCTION AND CONNECTIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.2.2, 1705.11.2, 1705.11.3, UFC 4 023 03		
TASK	INSPECTION TYPE[1]	DESCRIPTION
1. Trusses spanning 60-feet or greater where/if applies	**PERFORM**	Verify that temporary and permanent truss restraint/bracing is installed in accordance with approved truss submittal package.
2. Welded connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all welds composing part of the main wind or seismic force resisting system, including shearwalls, braces, collectors (drag struts), and hold-downs.
3. Connections (seismic and/or wind resisting system)	OBSERVE	Visually inspect all screw attachment, bolting, anchoring and other fastening of components within the main wind or seismic force resisting system, including roof deck, roof framing, exterior wall covering, wall to roof/floor connections, braces, collectors (drag struts) and hold-downs.
4. Cold-formed steel (progressive collapse resisting system where/if applies)	OBSERVE	Verify proper welding operations, screw attachment, bolting, anchoring and other fastening of components within the progressive collapse resisting system, including horizontal tie force elements, vertical tie force elements and bridging elements (UFC 4 023 03).

END SECTION

STRUCTURAL - OPEN-WEB STEEL JOISTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

OPEN-WEB STEEL JOISTS AND JOIST GIRDERS – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.2.3		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Installation of open-web steel joists and joist girders	OBSERVE	✓ End connections – welded or bolted ✓ Bridging – horizontal and diagonal

END SECTION

[1] **PERFORM**: Perform these tasks for each weld, fastener or bolted connection, and required verification.
OBSERVE: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

STRUCTURAL - CONCRETE CONSTRUCTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect reinforcement, including prestressing tendons, and verify placement.	OBSERVE	Verify prior to placing concrete that reinforcing is of specified type, grade and size; that it is free of oil, dirt and unacceptable rust; that it is located and spaced properly; that hooks, bends, ties, stirrups and supplemental reinforcement are placed correctly; that lap lengths, stagger and offsets are provided; and that all mechanical connections are installed per the manufacturer's instructions and/or evaluation report.
2. Reinforcing bar welding	OBSERVE	✓ Verify weldability of reinforcing bars other than ASTM A 706 ✓ Inspect single-pass fillet welds, maximum 5/16" in accordance with AWS D1.4
3. All other welding	**CONTINUOUS**	Visually inspect all welds in accordance with AWS D1.4
4. Cast in place anchors and post installed drilled anchors (downward inclined)	OBSERVE	Verify prior to placing concrete that cast in place anchors and post installed drilled anchors have proper embedment, spacing and edge distance.
5. Post-installed adhesive anchors in horizontal or upward inclined orientations	**CONTINUOUS AND DOCUMENT**	✓ Inspect as required per approved ICC-ES report ✓ Verify that installer is certified for installation of horizontal and overhead installation applications ✓ Inspect proof loading as required by the contract documents
6. Verify use of required mix design	OBSERVE	Verify that all mixes used comply with the approved construction documents
7. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete	**CONTINUOUS**	At the time fresh concrete is sampled to fabricate specimens for strength test verify these tests are performed by qualified technicians.
8. Inspect concrete and/or shotcrete placement for proper application techniques	**CONTINUOUS**	Verify proper application techniques are used during concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.
9. Verify maintenance of specified curing temperature and technique	OBSERVE	Inspect curing, cold weather protection, and hot weather protection procedures.
10. Pre-stressed concrete	**CONTINUOUS**	Verify application of prestressing forces and grouting of bonded prestressing tendons.

CONTINUED ON FOLLOWING PAGE

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

STRUCTURAL - CONCRETE CONSTRUCTION (CONTINUED)

CONCRETE CONSTRUCTION, INCLUDING COMPOSITE DECK – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC TABLE 1705.3 (ACI 318 REFERENCES NOTED IN IBC TABLE)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Inspect erection of precast concrete members	OBSERVE	
12. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	OBSERVE	
13. Inspect formwork for shape, location and dimensions of the concrete member being formed.	OBSERVE	

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
DOCUMENT: Document in a report that the work has been performed as required. This is in addition to all other required reports.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

STRUCTURAL - MASONRY CONSTRUCTION SECTION (ALL RISK CATEGORIES)

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE AT START OF CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Compliance with approved submittals prior to start	OBSERVE	
2. Proportions of site-mixed mortar.	OBSERVE	
3. Grade and type of reinforcement, anchor bolts, and prestressing tendons and anchorages	OBSERVE	
4. Prestressing technique	OBSERVE	
5. Properties of thin bed mortar for AAC masonry	OBSERVE	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE PRIOR TO GROUTING IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
6. Grout space	OBSERVE	
7. Proportions of site-prepared grout and prestressing grout for bonded tendons	OBSERVE	
8. Proportions of site-mixed grout and prestressing grout for bonded tendons	OBSERVE	
9. Placement of masonry units and mortar joints	OBSERVE	
10. Welding of reinforcement	**CONTINUOUS**	
MASONRY CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE DURING CONSTRUCTION IBC 1705.4 (ACI 530-13 TABLE 3.1.2 & 3.1.3)		
TASK	INSPECTION TYPE [1]	DESCRIPTION
11. Size and location of structural elements is in compliance	OBSERVE	
12. Preparation, construction, and protection of masonry during cold weather (temperature below 40°F (4.4°c) or hot weather (temp above 90°F (32.2°C))	OBSERVE	
13. Application and measurement of prestressing force	**CONTINUOUS**	
14. Placement of grout and prestressing grout for bonded tendons	**CONTINUOUS**	
15. Placement of AAC masonry units and construction of thin bed mortar joints	**CONTINUOUS**	Continuous for first 5000 square feet only (465 square meters).
16. Observe preparation of grout specimens, mortar specimens, and/or prisms	OBSERVE	
17. Type, size and placement of reinforcement, connectors, anchor bolts and prestressing tendons and anchorages, including details of anchorage of masonry to structural members, frames, or other construction	OBSERVE	

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

STRUCTURAL - WOOD CONSTRUCTION – SPECIALTY ITEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.5		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. High-load diaphragms where applicable	OBSERVE	Verify thickness and grade of sheathing, size of framing members at panel edges, nail diameters and length, and the number of fastener lines and that fastener spacing is per approved contract documents.
2. Metal-plate connected wood trusses spanning 60 feet or greater	OBSERVE	Verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package

END SECTION

STRUCTURAL - WOOD CONSTRUCTION - SEISMIC & WIND SECTION

THIS SECTION IS APPLICABLE IF BOX IS CHECKED: ☐

WOOD CONSTRUCTION SEISMIC AND WIND – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.11 & 1705.12.2		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Nailing, bolting, anchoring and other fastening of elements of the main wind/seismic force-resisting system	OBSERVE (CONTINUOUS FOR GLUING)	Includes connectors for: shearwall sheathing, roof/floor sheathing, drag struts/collectors (double top plates), braces, hold downs, roof connections to exterior walls.

END SECTION

STRUCTURAL – ISOLATION AND ENERGY DISSIPATION SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ISOLATION AND ENERGY DISSIPATION SYSTEMS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC TABLE 1705.12.8		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Fabrication and installation	OBSERVE	Verify that fabrication and installation of isolator units and energy dissipation devices conform to manufacturer's recommendations and approved construction documents
2. Testing of seismic isolation Systems in seismically isolated structures		Seismic Isolation Systems in seismically isolated structures shall be tested accordance with ASCE 7, Section 17.8

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

GEOTECHNICAL - SOILS INSPECTION SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

SOILS INSPECTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Materials below shallow foundations are adequate to achieve the design bearing capacity.	OBSERVE	
2. Excavations are extended to proper depth and have reached proper material	OBSERVE	
3. Perform classification and testing of compacted fill materials	**OBSERVE**	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	**CONTINUOUS**	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	OBSERVE	During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report

END SECTION

GEOTECHNICAL - DRIVEN DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☒

DEEP DRIVEN FOUNDATION CONSTRUCTION – VERIFY THE FOLLOWING ARE IN COMPLIANCE IBC 1705.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify element materials, sizes and lengths comply with requirements	**CONTINUOUS**	
2. Inspect driving operations and maintain complete and accurate records for each element	**CONTINUOUS**	
3. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achiever design capacity, record tip and butt elevations and document any damage to foundation element	**CONTINUOUS**	
4. Determine capacities of test elements and conduct additional load tests if required.	**CONTINUOUS**	
5. For steel or concrete elements, perform additional special inspections in accordance with the Steel and Concrete sections in this schedule		

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.
CONTINUOUS: Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

GEOTECHNICAL - HELICAL PILE FOUNDATIONS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

HELICAL PILE FOUNDATIONS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.9		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Record installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required. The approved geotechnical report and the contract documents shall be used to determine compliance	**CONTINUOUS**	

END SECTION

GEOTECHNICAL - CAST IN PLACE DEEP FOUNDATION ELEMENTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

CAST IN PLACE DEEP FOUNDATION ELEMENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.8		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	**CONTINUOUS**	
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	**CONTINUOUS**	For concrete elements, perform additional special inspections in accordance with the Concrete section in this schedule

END SECTION

[1] **CONTINUOUS:** Constant monitoring of identified tasks by a special inspector over the duration of performance of said tasks.

FIRE PROTECTION - SPRAYED FIRE-RESISTANT MATERIALS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SPRAYED FIRE RESISTANT MATERIALS (SFRM) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.14		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Substrate condition	OBSERVE	Prior to application, confirm that surfaces have been prepared according to the approved fire-resistance design and manufacturer's instructions.
2. Material thickness	OBSERVE	Verify SFRM thickness according to 2018 IBC 1705.14.4
3. Material density	OBSERVE	Verify SFRM density according to 2018 IBC 1705.14.5
4. Bond strength	OBSERVE	Verify bond strength of cured SFRM according to IBC 1705.14.6

END SECTION

FIRE PROTECTION - MASTIC AND INTUMESCENT COATINGS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.15		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspect according to AWCI 12-B and the contract documents	OBSERVE	Inspections shall be performed in accordance with AWCI 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials.

END SECTION

FIRE PROTECTION – FIRE RESISTANT PENETRATIONS AND JOINTS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

FIRE RESISTANT PENETRATIONS AND JOINTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.17		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Inspections of penetration firestop systems conducted in accordance with ASTM E 2174.	OBSERVE	
2. Inspections of fire-resistant joint systems conducted in accordance with ASTM E 2393	OBSERVE	

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

FIRE PROTECTION – SMOKE CONTROL SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

SMOKE CONTROL – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.18		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Verify device locations and perform leakage testing	OBSERVE	Perform during erection of ductwork and prior to concealment
2. Pressure difference testing, flow measurements and detection and control verification	OBSERVE	Perform prior to occupancy and after sufficient completion

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

ARCHITECTURAL - EXTERIOR INSULATION AND FINISH SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.16		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Water resistive barrier coating applied over a sheathing substrate.	OBSERVE	Verify that water resistive barrier coating complies with ASTM E 2570.

END SECTION

ARCHITECTURAL – ARCHITECTURAL COMPONENTS

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

ARCHITECTURAL COMPONENTS – VERIFY THE FOLLOWING ARE IN COMPLIANCE 2018 IBC 1705.12.5, 1705.12.7		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Erection and fastening of exterior cladding and interior and exterior veneer.	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if height is less than 30 feet or weight is less than 5psf**
2. Interior and exterior non-load bearing walls	OBSERVE	Verify appropriate materials, fasteners and attachment at commencement of work and at completion. **Inspector Note: Inspection not required if interior non-load bearing walls weigh less than 15psf**
3. Access floors	OBSERVE	Verify that anchorage complies with approved construction documents.
4. Storage racks	OBSERVE	Verify that anchorage complies with approved construction documents. Inspection of post-installed anchors shall comply with approved ICC-ES report. **Inspector Note: Not required for racks less than 8 feet in height**

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

PLUMBING/MECHANICAL/ELECTRICAL DESIGNATED SEISMIC SYSTEMS SECTION

ALL OR PORTIONS OF THIS SECTION ARE APPLICABLE IF BOX IS CHECKED: ☐

PLUMBING, MECHANICAL AND ELECTRICAL IBC 1705.12.6		
TASK	INSPECTION TYPE [1]	DESCRIPTION
1. Anchorage of electrical equipment for emergency and standby power systems	OBSERVE	✓ Check for general conformance
2. Anchorage of all other electrical equipment in Seismic Design Categories E and F only (See first page of this schedule for Seismic Design Category)	OBSERVE	✓ Check for general conformance
3. Installation and anchorage of piping designed to carry hazardous materials and their associated mechanical units.	OBSERVE	✓ Check for general conformance
4. Installation and anchorage of vibration isolation systems where the construction documents require a nominal clearance of ¼" or less between support framing and restraint.	OBSERVE	✓ Check for general conformance
5. Verification of clearance between fire sprinkler piping and surrounding mechanical and electrical equipment, including ductwork, piping and their structural supports.	OBSERVE	✓ Check for minimum clearances noted in ASCE7 13.2.3 or a nominal clearance of not less than 3 inches

END SECTION

[1] **OBSERVE**: Observe these items on a random sampling basis daily to insure that applicable requirements are met. Operations need not be delayed pending these inspections at contractor's risk.

SECTION 02 20 00 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 –GENERAL

1.1 SUMMARY

A. The scope of work includes all labor, materials, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with protection of existing trees and other plants as shown on the drawings and as specified herein.

1. Provide preconstruction evaluations.
2. Provide tree and plant protection fencing.
3. Provide protection of root zones and above ground tree and plants.
4. Provide pruning of existing trees and plants.
5. Coordinate with the requirements of Section Planting Soil for modifications to the soil within the root zone of existing trees and plants.
6. Provide all insect and disease control.
7. Provide maintenance of existing trees and plants including irrigation during the construction period as recommended by the arborist report.
8. Provide maintenance of existing trees and plants including irrigation during the post construction plant maintenance period.
9. Remove tree protection fencing and other protection from around and under trees and plants.
10. Clean up and disposal of all excess and surplus material.

1.2 CONTRACT DOCUMENTS

A. Shall consist of specifications and general conditions and the drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

B. It is the intent of this section that the requirements apply to all sections of the project specification such that any subcontractor must comply with the restrictions on work within designated Tree and Plant Protection Areas.

1.3 RELATED DOCUMENTS AND REFERENCES

A. Related Documents:

1. Drawings and general provisions of contract including general and supplementary conditions and Division I specifications apply to work of this section.
2. 310000 Earthwork
3. 311000 Site Clearing
4. 312500 Erosion and Pollution Control
5. 318000 Clean-Up and Seeding
6. 329113 Topsoil Harvesting
7. 329200 Soil Preparation

References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail.

8. ANSI A 300 (Part 5) – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current editions.
9. Pruning practices shall conform with recommendations “Structural Pruning: A Guide For The Green Industry”; Published by Urban Tree Foundation, Visalia, California; most current edition.
10. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign Il, most current edition.

1.4 VERIFICATION

A. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and quantities, and shall immediately inform the Owner’s Representative of any discrepancies between the information on the drawings and the actual conditions, refraining from doing any work in said areas until given approval to do so by the Owner’s Representative.

1.5 PERMITS AND REGULATIONS

A. The Contractor shall obtain and pay for all permits related to this section of the work unless previously excluded under provision of the contract or general conditions. The Contractor shall comply with all laws and ordinances bearing on the operation or conduct of the work as drawn and specified. If the Contractor observes that a conflict exists between permit requirements and the work outlined in the contract documents, the Contractor shall promptly notify the Owner’s Representative in writing including a description of any necessary changes and changes to the contract price resulting from changes in the work.

B. Wherever references are made to standards or codes in accordance with which work is to be performed or tested, the edition or revision of the standards and codes current on the effective date of this contract shall apply, unless otherwise expressly set forth.

C. In case of conflict among any referenced standards or codes or between any referenced standards and codes and the specifications, the more restrictive standard shall apply or Owner’s Representative shall determine which shall govern.

1.6 PROTECTION OF WORK, PROPERTY AND PERSON

A. The Contractor shall protect the work, adjacent property, and the public, and shall be responsible for any damages or injury due to his/her actions.

1.7 CHANGES IN THE WORK

A. The Owner’s Representative may order changes in the work, and the contract sum should be adjusted accordingly. All such orders and adjustments plus claims by the Contractor for extra compensation must be made and approved in writing before executing the work involved.

1.8 CORRECTION OF WORK

A. The Contractor shall re-execute any work that fails to conform to the requirements of the contract and shall remedy defects due to faulty materials or workmanship upon written notice from the Owner's Representative, at the soonest possible time that can be coordinated with other work and seasonal weather demands.

1.9 DEFINITIONS

All terms in this specification shall be as defined in the "Glossary of Arboricultural Terms" or as modified below.

A. Owner's Representative: The person appointed by the Owner to represent their interest in the review and approval of the work and to serve as the contracting authority with the Contractor. The Owner's Representative may appoint other persons to review and approve any aspects of the work.

B. Reasonable and reasonably: When used in this specification is intended to mean that the conditions cited will not affect the establishment or long term stability, health or growth of the plant. This specification recognizes that plants are not free of defects, and that plant conditions change with time. This specification also recognizes that some decisions cannot be totally based on measured findings and that profession judgment is required. In cases of differing opinion, the Owner's Representative expert shall determine when conditions within the plant are judged as reasonable.

C. Shrub: Woody plants with mature height approximately less than 25 feet.

D. Tree and Plant Protection Area: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle centered on the trunk with each tree with a radius equal to the clown dripline unless otherwise indicated by the owner's representative.

E. Tree: Single and multi-stemmed plants, including palms with anticipated mature height approximately greater than 25 feet or any plant identified on the plans as a tree.

1.10 SUBMITTALS

A. ARBORIST REPORT: Prior to the start of construction, submit, for approval by the Owner's Representative, the report of a consulting arborist who is a registered Consulting Arborist® (RCA) with American Society of Consulting Arborists or an ISA Board Certified Master Arborist, which details the following information for all trees to remain within the area designated on the drawings as the Tree and Plant Protection Area. The report shall include the following:

1. A description of each tree to remain indicating its genus and species, condition including any visible damage to the root system or soil within the root zone, tree diameter at breast height (dbh) and approximate height, size and any visible disease, insect infestations and or branch and trunk structural deficiencies.
2. The report shall note all trees or parts of trees, which are considered a hazard or significant or extreme risk level. Include the International Society of Arboriculture hazard evaluation sheet for each tree, which may reasonably be identified as a potential hazard tree.

3. Recommendations as to treatment of all insect, disease and structural problems encountered.
4. Recommendations for fertilizer treatments, if any.
5. Recommendations for root and/or canopy preservation measures.
6. A plan of the site showing the location of all trees included in the report.

B. PRODUCT DATA: Submit manufacturer product data and literature describing all products required by this section to the Owner's Representative for approval. Provide submittal four weeks before the start of any work at the site.

C. QUALIFICATIONS SUBMITTAL: For each applicable person expected to work on the project, provide copies of the qualifications and experience of the Consulting arborist, proof of either the registered Consulting Arborist® (RCA) with American Society of Consulting Arborists or an ISA Board Certified Master Arborist and any required Herbicide/Pesticide license to the Owner's Representative, for review prior to the start of work.

1.11 OBSERVATION OF THE WORK

A. The Owner's Representative may inspect the work at any time.

1.12 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre - construction meeting with the Owner's Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

1. The following Contractors shall attend the preconstruction conference:
   a. General Contractor.
   b. Consulting Arborist.
   c. Subcontractor assigned to install Tree and Plant Protection measures.
   d. Earthwork Contractor.
   e. All site utility Contractors that may be required to dig or trench into the soil.
   f. Landscape subcontractor.
   g. Irrigation subcontractor

B. Prior to this meeting, mark all trees and plants to remain and or be removed as described in this specification for review and approval by the Owner's Representative.

1.13 QUALITY ASSURANCE

A. Contractor qualifications:

1. All pruning, branch tie back, tree removal, root pruning, and fertilizing required by this section shall be performed by or under the direct supervision of ISA Certified Arborist Submit aforementioned individual's qualifications for approval by the Owner's Representative.
2. All applications of pesticide or herbicide shall be performed by a person maintaining a current state license to apply chemical pesticides valid in the jurisdiction of the project. Submit copies of all required state licensing certificates including applicable chemical applicator licenses.

PART 2 – PRODUCTS

2.1 MULCH

A. Mulch shall be coarse, ground, from tree and woody brush sources. The minimum range of fine particles shall be 3/8 inch or less in size and a maximum size of individual pieces shall be approximately 1 to 1-1/2 inch in diameter and maximum length of approximately 4 to 8 inches. No more that 25% of the total volume shall be fine particles and no more than 20% of total volume be large pieces.
   1. It is understood that Mulch quality will vary significantly from supplier to supplier and region to region. The above requirements may be modified to conform to the source material from locally reliable suppliers as approved by the Owner's Representative.

B. Submit suppliers product data that product meets the requirements and two gallon sample for approval.

2.2 WOOD CHIPS:

A. Wood Chips from an arborist chipping operation with less than 20% by volume green leaves. Chips stockpiled from the tree removal process may be used.

2.3 TREE PROTECTION FENCING:

A. PLASTIC MESH FENCE: Heavy - duty orange plastic mesh fencing fabric 48 inches wide. Fencing shall be attached to metal "U" or "T" post driven into the ground of sufficient depth to hold the fabric solidly in place with out sagging. The fabric shall be attached to the post using attachment ties of sufficient number and strength to hold up the fabric without sagging. The Owner's Representative may request, at any time, additional post, deeper post depths and or additional fabric attachments if the fabric begins to sag, lean or otherwise not present a sufficient barrier to access.

B. CHAIN LINK FENCE: 6 feet tall metal chain link fence set in metal frame panels on movable core drilled concrete blocks of sufficient size to hold the fence erect in areas of existing paving to remain.

C. GATES: For each fence type and in each separate fenced area, provide a minimum of one 3 foot wide gate. Gates shall be lockable. The location of the gates shall be approved by the Owner's Representative.

D. Submit suppliers product data that product meets the requirements for approval.

2.4 TREE PROTECTION SIGN:

A. Heavy-duty cardboard signs, 8.5 inches x 11 inches, white colored background with black 2 inch high or larger letters block letters. The signs shall be attached to the tree protection fence every 50 feet oc. The tree protection sign shall read "Tree and Plant Protection Area- Keep Out".

2.5 TREE GROWTH REGULATOR (TGR)

A. Cambistat 25C.

B. Submit suppliers product data that product meets the requirements for approval.

2.6 MATTING

A. Matting for vehicle and work protection shall be heavy duty matting designed for vehicle loading over tree roots, Alturnamats as manufactured by Alturnamats, Inc. Franklin, PA 16323 or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

2.7 GEOGRID

A. Geogrid shall be woven polyester fabric with PVC coating, Uni-axial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, acids.

1. Geogrid shall be Miragrid 2XT as manufactured by Ten Cate Nicolon, Norcross, GA. http://www.tencate.com or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

2.8 FILTER FABRIC

A. Filter Fabric shall be nonwoven polypropylene fibers, inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

1. Mirafi 135 N as manufactured by Ten Cate Nicolon, Norcross, GA. http://www.tencate.com or approved equal.

B. Submit suppliers product data that product meets the requirements for approval.

PART 3 – EXECUTION

3.1 SITE EXAMINATION

A. Examine the site, tree, plant and soil conditions. Notify the Owner's Representative in writing of any conditions that may impact the successful Tree and Plant Protections that is the intent of this section.

3.2 COORDINATION WITH PROJECT WORK

A. The Contractor shall coordinate with all other work that may impact the completion of the work.

B. Prior to the start of Work, prepare a detailed schedule of the work for coordination with other trades.

C. Coordinate the relocation of any irrigation lines currently present on the irrigation plan, heads or the conduits of other utility lines or structures that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner's Representative of any conflicts encountered.

3.3 **TREE AND PLANT PROTECTION AREA**:

A. The Tree and Plant Protection Area is defined as all areas indicated on the tree protection plan. Where no limit of the Tree and Plant Protection area is defined on the drawings, the limit shall be the drip line (outer edge of the branch crown) of each tree.

3.4 **PREPARATION**:

A. Prior to the preconstruction meeting, layout the limits of the Tree and Plant Protection Area and then alignments of required Tree and Plant Protection Fencing and root pruning. Obtain the Owner's Representative's approval of the limits of the protection area and the alignment of all fencing and root pruning.

B. Flag all trees and shrubs to be removed by wrapping orange plastic ribbon around the trunk and obtain the Owner's Representative's approval of all trees and shrubs to be removed prior to the start of tree and shrub removal. After approval, mark all trees and shrubs to be removed with orange paint in a band completely around the base of the tree or shrub 4.5 feet above the ground.

C. Flag all trees and shrubs to remain with white plastic ribbon tied completely around the trunk or each tree and on a prominent branch for each shrub. Obtain the Owner's Representative's approval of all trees and shrubs to be remain prior to the start of tree and shrub removal.

D. Prior to any construction activity at the site including utility work, grading, storage of materials, or installation of temporary construction facilities, install all tree protection fencing, Filter Fabric, silt fence, tree protection signs, Geogrid, Mulch and or Wood Chips as shown on the drawings.

3.5 SOIL MOISTURE

A. Volumetric soil moisture level, in all soils within the Tree and Plant Protection Area shall be maintained above permanent wilt point to a depth of at least 8 inches. No soil work or other activity shall be permitted within the Tree and Plant Protection Area when the volumetric soil moisture is above field capacity. The permanent wilt point and field capacity for each type of soil texture shall be defined as follows (numbers indicate percentage volumetric soil moisture).

Soil type	Permanent wilt point v/v	Field capacity v/v
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

1. Volumetric soil moisture shall be measured with a digital, electric conductivity meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent meter.

B. The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend operations until the soil moisture drains to below field

capacity.

3.6 ROOT PRUNING:

A. Prior to any excavating into the existing soil grade within 25 feet of the limit of the Tree and Plant Protection Area or trees to remain, root prune all existing trees to a depth of 24 inches below existing grade in alignments following the edges of the Tree and Plant Protection Area or as directed by the Owner's Representative. Root pruning shall be in conformance with ANSI A300 (part 8) latest edition.

1. Using a rock saw, chain trencher or similar trenching device, make a vertical cut within 2 feet of the limit of grading.
2. After completion of the cut, make clean cuts with a lopper, saw or pruner to remove all torn root ends on the tree side of the excavation, and backfill the trench immediately with existing soil, filling all voids.

3.7 INSTALLATION OF GEOGRIDS, FILTER FABRIC, MATTING, WOOD CHIPS AND OR MULCH

A. Install Geogrids, Filter Fabric, matting, Wood Chips and or Mulch in areas and depths shown on the plans and details or as directed by the Owner's representative. In general it is the intent of this specification to provide the following levels of protection:

1. All areas within the Tree and Plant Protection area provide a minimum of 5 inches of Wood Chips or Mulch.
2. Areas where foot traffic or storage of lightweight materials is anticipated to be unavoidable provide a layer of Filter Fabric under the 5 inches of Wood Chips or Mulch.
3. Areas where occasional light vehicle traffic is anticipated to be unavoidable provide a layer of Geogrids under 8 inches of Wood Chips or Mulch.
4. Areas where heavy vehicle traffic is unavoidable provide a layer of Geogrids under 8 - 12 inches of Wood Chips or Mulch and a layer of matting over the Wood Chips or Mulch.

B. The Owner's Representative shall approve the appropriate level of protection.

C. In the above requirements, light vehicle is defined as a track skid steer with a ground pressure of 4 psi or lighter. A heavy vehicle is any vehicle with a tire or track pressure of greater than 4 psi. Lightweight materials are any packaged materials that can be physically moved by hand into the location. Bulk materials such as soil, or aggregate shall never be stored within the Tree and Plant Protection Area.

3.8 **PROTECTION**:

A. Protect the Tree and Plant Protection Area at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves and roots of all plants; and contamination of the soil, bark or leaves with construction materials, debris, silt, fuels, oils, and any chemicals substance. Notify the Owner's Representative of any spills, compaction or damage and take corrective action immediately using methods approved by the Owner's Representative.

3.9 GENERAL REQUIREMENTS AND LIMITATIONS FOR OPERATIONS WITHIN THE

TREE AND PLANT PROTECTION AREA:

A. The Contractor shall not engage in any construction activity within the Tree and Plant Protection Area without the approval of the Owner's Representative including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks. Permitted activity, if any, within the Tree and Plant Protection Area maybe indicated on the drawings along with any required remedial activity as listed below.

B. In the event that construction activity is unavoidable within the Tree and Plant Protection Area, notify the Owner's Representative and submit a detailed written plan of action for approval. The plan shall include: a statement detailing the reason for the activity including why other areas are not suited; a description of the proposed activity; the time period for the activity, and a list of remedial actions that will reduce the impact on the Tree and Plant Protection Area from the activity. Remedial actions shall include but shall not be limited to the following:

1. In general, demolition and excavation within the drip line of trees and shrubs shall proceed with extreme care either by the use of hand tools, directional boring and or Air Knife excavation where indicated or with other low impact equipment that will not cause damage to the tree, roots or soil.
2. When encountered, exposed roots, 1 inches and larger in diameter shall be worked around in a manner that does not break the outer layer of the root surface (bark). These roots shall be covered in Wood Chips and shall be maintained above permanent wilt point at all times. Roots one inch and larger in diameter shall not be cut with out the approval of the owners representative. Excavation shall be tunneled under these roots without cutting them. In the areas where roots are encountered, work shall be performed and scheduled to close excavations as quickly as possible over exposed roots.
3. Tree branches that interfere with the construction may be tied back or pruned to clear only to the point necessary to complete the work. Other branches shall only be removed when specifically indicated by the Owner's Representative. Tying back or trimming of all branches and the cutting of roots shall be in accordance with accepted arboricultural practices (ANSI A300, part 8) and be performed under supervision of the arborist.
4. Matting: Install temporary matting over the Wood Chips or Mulch to the extent indicated. Do not permit foot traffic, scaffolding or the storage of materials within the Tree and Plant Protection Area to occur off of the temporary matting.
5. Trunk Protection: Protect the trunk of each tree to remain by covering it with a ring of 8 foot long 2 inch x 6 - inch planks loosely banded onto the tree with 3 steel bands. Staple the bands to the planks as necessary to hold them securely in place. Trunk protection must by kept in place no longer than 12 months. If construction requires work near a particular tree to continue longer than 12 months, the steel bands shall be inspected every six months and loosened if they are found to have become tight.
6. Air Excavation Tool: If excavation for footings or utilities is required within the Tree and Plant Protection Area, air excavation tool techniques shall be used where practical or as designed on the drawings.

    a. Remove the Wood Chips from an area approximately 18 inches beyond the limits of the hole or trench to be excavated. Cover the Wood Chips for a distance of not less than 15 feet around the limit of the excavation area with Fil-

ter Fabric or plastic sheeting to protect the Wood Chips from silt. Mound the Wood Chips so that the plastic slopes towards the excavation.

b. Using a sprinkler or soaker hose, apply water slowly to the area of the excavation for a period of at least 4 hours, approximately 12 hours prior to the work so that the ground water level is at or near field capacity at the beginning of the work. For excavations that go beyond the damp soil, rewet the soil as necessary to keep soil moisture near field capacity.
c. Using an air excavation tool specifically designed and manufactured for the intended purpose, and at pressures recommended by the manufacturer of the equipment, fracture the existing soil to the shape and the depths required. Work at rates and using techniques that do not harm tree roots. Air pressure shall be a maximum of 90-100 psi.
    1.) The air excavation tool shall be “Air-Spade” as manufactured by Concept Engineering Group, Inc., Verona, PA (412) 826-8800, or Air Knife as manufactured by Easy Use Air Tools, Inc. Allison Park, Pa (866) 328-5723 or approved equal.
d. Using a commercial, high-powered vacuum truck if required, remove the soil from the excavation produced by the Air Knife excavation. The vacuum truck should generally operate simultaneously with the hose operator, such that the soil produced is picked up from the excavation hole, and the exposed roots can be observed and not damaged by the ongoing operation. Do not drive the vacuum truck into the Tree and Plant Protection Area unless the area is protected from compaction as approved in advance by the Owner’s Representative.
e. Remove all excavated soil and excavated Wood Chips, and contaminated soil at the end of the excavation.
f. Schedule the work so that foundations or utility work is completed immediately after the excavation. Do not let the roots dry out. Mist the roots several times during the day. If the excavated area must remain open over night, mist the roots and cover the excavation with black plastic.
g. Dispose of all soil in a manner that meets local laws and regulations.
h. Restore soil within the trench as soon as the work is completed. Utilize soil of similar texture to the removed soil and lightly compact with hand tools. Leave soil mounded over the trench to a height of approximately 10% of the trench depth to account for settlement.
i. Restore any Geogrids, Filter Fabric, Wood Chips or Mulch and or matting that was previously
required for the area.

3.10 **TREE REMOVAL**:

A. Remove all trees indicated by the drawings and specifications, as requiring removal, in a manner that will not damage adjacent trees or structures or compacts the soil.

B. Remove trees that are adjacent to trees or structures to remain, in sections, to limit the opportunity of damage to adjacent crowns, trunks, ground plane elements and structures.

C. Do not drop trees with a single cut unless the tree will fall in an area not included in the Tree and Plant Protection Area. No tree to be removed within 50 feet of the Tree and Plant Protection Area shall be pushed over or up-rooted using a piece of grading equipment.

D. Protect adjacent paving, soil, trees, shrubs, ground cover plantings and understory plants to remain from damage during all tree removal operations, and from construction operations. Protection shall include the root system, trunk, limbs, and crown from breakage or scarring, and the soil from compaction.

E. Remove stumps and immediate root plate from existing trees to be removed. Grind trunk bases and large buttress roots to a depth of the largest buttress root or at least 18 inches below the top most roots which ever is less and over the area of three times the diameter of the trunk (DBH).

1. For trees where the stump will fall under new paved areas, grind roots to a total depth of 18 inches below the existing grade. If the sides of the stump hole still have greater than approximately 20% wood visible, continue grinding operation deeper and or wider until the resulting hole has less than 20% wood. Remove all wood chips produced by the grinding operation and back fill in 8 inch layers with controlled fill of a quality acceptable to the site engineer for fill material under structures, compacted to 95% of the maximum dry density standard proctor. The Owner's Representative shall approve each hole at the end of the grinding operation.
2. In areas where the tree location is to be a planting bed or lawn, remove all woodchips and backfill stump holes with planting soil as defined in Specification Section Planting Soil, in maximum of 12 inch layers and compact to 80 - 85% of the maximum dry density standard proctor.

3.11 PRUNING:

A. Within six months of the estimated date of substantial completion, prune all dead or hazardous branches larger than 2 inch in diameter from all trees to remain.

B. Implement all pruning recommendations found in the arborist report.

C. Prune any low, hanging branches and vines from existing trees and shrubs that overhang walks, streets and drives, or parking areas as follows:

1. Walks - within 8 feet vertically of the proposed walk elevation.
2. Parking areas - within 12 feet vertically of the proposed parking surface elevation.
3. Streets and drives - within 14 feet vertically of the proposed driving surface elevation.

D. All pruning shall be done in accordance with ANSI A300 (part 1), ISA BMP Tree Pruning (latest edition, and the "Structural Pruning: A Guide for the Green Industry", Edward Gilman, Brian Kempf, Nelda Matheny and Jim Clark, 2013 Urban Tree Foundation, Visalia CA.

E. Perform other pruning task as indicated on the drawings or requested by the Owner's Representative.

F. Where tree specific disease vectors require, sterilize all pruning tools between the work in individual trees.

3.12 TREE GROWTH REGULATOR INJECTION (TGR)

A. At the start of the construction contract period, treat all trees, indicated on the Plan, with Tree Growth Regulator at recommended rates, time of year and methods indicated by the product distributor.

3.13 WATERING

A. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants to be preserved during the entire construction period. Adequate water is defined to be maintaining soil moisture above the permanent wilt point to a depth of 8 inches or greater.

B. The Contractor shall adjust the automatic irrigation system, if available, and apply additional water, using hoses or water tanks as required.

C. Periodically test the moisture content in the soil within the root zone to determine the water content.

3.14 WEED REMOVAL

A. During the construction period, control any plants that seed in and around the fenced Tree and Plant Protection area at least three times a year.

1. All plants that are not shown on the planting plan or on the Tree and Plant Protection Plan to remain shall be considered as weeds.

B. At the end of the construction period provide one final weeding of the Tree and Plant Protection Area.

3.15 INSECT AND DISEASE CONTROL

A. Monitor all plants to remain for disease and insect infestations during the entire construction period. Provide all disease and insect control required to keep the plants in a healthy state using the principles of Integrated Plant Management (IPM). All pesticides shall be applied by a certified pesticide applicator.

3.16 CLEAN-UP

A. During tree and plant protection work, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.

1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.

B. Once tree protection work is complete, wash all soil from pavements and other structures. Ensure that Mulch is confined to planting beds.

C. Make all repairs to grades, ruts, and damage to the work or other work at the site.

D. Remove and dispose of all excess Mulch, Wood Chips, packaging, and other material brought to the site by the Contractor.

3.17 REMOVAL OF FENCING AND OTHER TREE AND PLANT PROTECTION

A. At the end of the construction period or when requested by the Owner's Representative remove all fencing, Wood Chips or Mulch, Geogrids and Filter Fabric, trunk protection and or any other Tree and Plant Protection material.

3.18 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

A. Any trees or plants designated to remain and which are damaged by the Contractor shall be replaced in kind by the Contractor at their own expense. Trees shall be replaced with a tree of similar species and of equal size or 6 inch caliper which ever is less. Shrubs shall be replaced with a plant of similar species and equal size or the largest size plants reasonably available which ever is less. Where replacement plants are to be less than the size of the plant that is damaged, the Owner's Representative shall approve the size and quality of the replacement plant.

1. All trees and plants shall be installed per the requirements of Specification Section Planting.

B. Plants that are damaged shall be considered as requiring replacement or appraisal in the event that the damage affects more than 25 % of the crown, 25% of the trunk circumference, or root protection area, or the tree is damaged in such a manner that the tree could develop into a potential hazard. Trees and shrubs to be replaced shall be removed by the Contractor at his own expense.

1. The Owner's Representative may engage an independent arborist to assess any tree or plant that appears to have been damaged to determine their health or condition.

C. Any tree that is determined to be dead, damaged or potentially hazardous by the Owner's arborist and upon the request of the Owner's Representative shall be immediately removed by the Contractor at no additional expense to the owner. Tree removal shall include all clean up of all wood parts and grinding of the stump to a depth sufficient to plant the replacement tree or plant, removal of all chips from the stump site and filling the resulting hole with topsoil.

D. Any remedial work on damaged existing plants recommended by the consulting arborist shall be completed by the Contractor at no cost to the owner. Remedial work shall include but is not limited to: soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators (TGR).

E. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

END OF SECTION 02 20 00

SECTION 02 41 00 – DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of requirements for the demolition of concrete slabs, steel sheet piles, metal railing, removal of material to be salvaged, reused or discarded, and miscellaneous and incidental items and removals necessary for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to complete the demolition work as indicated on the project drawings and specified herein.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American National Standards Institute (ANSI)

ANSI/ASSE A10.6	(2006, R2016) Safety and Health Program Requirements for Demolition Operations.

C. American Society for Testing and Materials (ASTM)

ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D. Occupational Safety and Health Administration (OSHA), U.S. Code of Federal Regulations (CFR)

Title 29 Part 1926	Safety and Health Regulations for Construction

E. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40:

Part 61	National Emission Standards for Hazardous Air Pollutants

1.3 DEFINITIONS

A. Demolition: Dismantling, razing, destroying, or wrecking of any fixed building or structure or any part thereof together with any related handling and disposal operations. Demolition also includes removal of pipes, manholes, tanks, conduit, and other underground facilities, whether as a separate activity or in conjunction with construction of new facilities.

B. Modify: Provide all necessary material and labor to alter an existing item to the condition indicated or specified.

C. Relocate: Remove, protect, clean, and reinstall equipment, including electrical, instrumentation, and all ancillary components required to make the equipment fully functional, to the new location identified on the Drawings.

D. Renovation: Altering a facility or one or more facility components in any way.

E. Salvage/Salvageable: Remove and deliver, to the specified location(s), the equipment, building materials, or other items so identified to be saved from destruction, damage, or waste; such property to remain that of the Owner. Unless otherwise specified, title to items identified for demolition shall revert to Contractor.

1.4 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Preconstruction Submittals

1. Demolition Plan

a. Demolition Plan to include construction sequencing that sufficiently unloads the existing bulkhead wall before demolishing existing tie rods to ensure no areas of failure.

2. Existing Conditions

3. Copies of Notifications, Authorizations, and Permits

1.5 REGULATORY AND SAFETY REQUIREMENTS

A. When applicable, demolition Work shall be accomplished in strict accordance with 29 CFR 1926-Subpart T.

B. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the General Conditions, Contractor's safety requirements shall conform to ANSI A10.6.

1.6 PROJECT DESCRIPTION

A. Demolition Plan: Prepare a Demolition Plan and submit proposed demolition and removal procedures for approval before work is started. The Contractor shall submit a materials schedule and disposal schedule to accompany the demolition plan. The schedule shall

include applicable governing agency(s); material type; known contaminants; quantities; transportation; temporary storage; and disposal means, methods, and locations on a line item basis. The Contractor shall also include a schedule for the disconnection of utility services. No interruption of services to the portions of structure not under Contractor's control will be allowed. Include in the demolition plan procedures for removal which will prevent materials from being deposited within the waters of the Tar River or along adjacent shorelines, including during demolition of the bulkhead structures. The Contractor shall include in the demolition plan the final destination for debris that is removed off site. Include statements affirming Contractor inspection of the existing site and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers or equipment, state provisions for securing the safety of the workers and equipment throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with ANSI A10.6. Include in the plan procedures for protecting existing structures to remain, adjacent structures, and new structures from damage due to demolition operations or equipment. Plan shall be approved by Owner's Representative prior to work beginning.

B. General Requirements: Do not begin demolition until authorization is received from the Owner's Representative. Remove rubbish and debris from the project site daily, unless otherwise directed; do not allow accumulation. Store materials that cannot be removed daily in areas specified by the Owner's Representative. In the interest of occupational safety and health, perform the work in accordance with 29 CFR 1926-Subpart T and ANSI A10.6, and other applicable Sections.

1.7 SEQUENCING AND SCHEDULING

A. The Work of this Specification shall not commence until Contractor's demolition plan has been approved by the Owner's Representative.

B. Include the Work of this Specification in the progress schedule.

1.8 ITEMS TO REMAIN IN PLACE

A. Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged items as approved by the Owner's Representative. Coordinate the work of this Section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement require approval by the Owner's Representative prior to performing such work.

B. Existing Construction Limits and Protection: Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary

shoring and bracing for support of structural components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

C. Trees: Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place by a 6-foot high fence or in the Construction Drawings. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Owner's Representative.

D. Utility Service: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.

E. Facilities: Protect electrical and mechanical services and utilities to remain. Where removal of existing utilities is specified or indicated, provide temporary services or connections for electrical and mechanical utilities. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.9 BURNING

A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.10 QUALITY ASSURANCE

A. Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Owner's Representative in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ANSI A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

B. Dust and Debris Control: Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.11 PROTECTION

A. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades. Anchor barricades in a manner to prevent displacement by wind. Notify the Owner prior to beginning such work.

B. Protection of Personnel: Before, during and after the demolition work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of any structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.12 RELOCATIONS

A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Owner's Representative.

1.13 EXISTING CONDITIONS

A. Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Owner's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Digital images will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and a description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 - PRODUCTS

2.1 FILL MATERIAL

A. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

B. Provide fill material conforming to the definition of satisfactory soil material as defined in ASTM D2487. In addition, fill material must be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

PART 3 - EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

A. Paving and Slabs: The existing concrete slab is to be completely removed to the limits as indicated on the project drawings to allow for the installation of the new slab and bulkhead structure. The Contractor shall exercise caution during demolition so that all necessary

operations are not impeded or interrupted, and to avoid allowing debris and rubbish to fall into or enter the Tar River. Saw concrete along straight lines to the depth indicated or not less than 2 inches if not indicated. Make each cut perpendicular to the face. The remainder of the concrete may be broken out provided that the broken area is concealed in the finished work, or will not become, or remain a structural element in the finished work. At locations where the broken face cannot be concealed, or at locations where a straight face is required in the finished work, grind smooth or saw cut entirely through the concrete. Core drill at corners of demolition to not overcut concrete in areas where concrete is to remain. Cut concrete surfaces that are to have fresh concrete cast against them shall be roughened to ¼-inch amplitude. Provide neat sawcuts at limits of pavement removal as indicated.

B. Bulkhead: The existing bulkhead is to be removed to the limits as indicated on the project drawings to allow for the installation of the new bulkhead and soil anchors. The Contractor shall exercise caution during demolition to avoid allowing debris and rubbish to fall into or enter the Tar River. Where the existing bulkhead is to be cut below the existing Tie Rod (EL 9.0 NAVD88), the Contractor shall provide a sequencing schedule as to exercise caution as to avoid failure of the existing wall.

C. Masonry: Sawcut and remove masonry so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Provide square, straight edges and corners where existing masonry adjoins new work and other locations.

D. Miscellaneous Metal: Salvage shop-fabricated items such as metal ladders, wire mesh partitions, metal railings, and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, and similar items. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Demolition Plan.

E. Utilities and Related Equipment: Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Owner's Representative and then only after temporary utility services have been approved and provided. Do not begin demolition work until all approved utility disconnections have been made. Shut off and cap utilities for future use, as indicated. If utility lines are encountered that are not shown on drawings, contact the Owner's Representative for further instructions.

F. Patching: Where removals leave holes, exposed ends of reinforcing steel or anchor bolts, and damaged surfaces exposed in the finished work, patch and repair these holes, exposed steel, and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surface of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated.

G. Items with Unique/Regulated Disposal Requirements: Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

3.2 BACKFILL

A. Do not use demolition debris as backfill material.

B. Fill excavations and other hazardous openings to existing ground level or level of new construction in accordance with Section 31 00 00 Earthwork.

3.3 DISPOSITION OF MATERIAL

A. Title to Materials: Except where specified, all materials and equipment removed or salvaged, and not reused, shall become the property of the Contractor and shall be removed from the site and disposed of properly. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Owner's Representative of the Contractor's demolition and removal procedures, and authorization by the Owner to begin demolition. The Owner will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site unless otherwise specified. At no time will discarded material be allowed to be placed in the water or along the adjacent shoreline. The Contractor shall develop a Demolition Plan which provides for the complete removal of indicated existing items without disposing of materials within the Tar River or along the adjacent shoreline.

B. Reuse of Materials and Equipment: Remove and store materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as the work progresses. Recondition materials and equipment designated for reuse before reinstallation. Replace items damaged during removal and salvage operations, or restore them as necessary to usable condition.

3.4 CLEANUP

A. Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas. Local regulations regarding hauling and disposal shall apply. The Contractor shall take all necessary measures to ensure that debris and rubbish do not fall into or enter the Tar River. In the event debris and rubbish enter the waterway, the Contractor shall remove it completely at no additional cost to the Owner.

END OF SECTION 02 41 00

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of requirements for materials, mixing, forming, placing, and curing reinforced cast-in-place concrete for the **Greenville Town Common & Esplanade Project** project **( )** at the City of Greenville (City) Town Common, including but not limited to: retaining walls, slabs, foundations and concrete caps. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary for the installation of all cast-in-place concrete as indicated on the project drawings and specified herein.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M 182	Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cottom Mats

C. American Concrete Institute (ACI)

ACI 117	(2010; R 2015) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 211.1	(191; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 301	(2020) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(2017) Guide to Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305.1	(2014) Specification for Hot Weather Concreting
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting

ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2023) Specification for Curing Concrete
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI MNL-66	(2020) ACI Detailing Manual

D. American Nation Standard Institute (ANSI)

ANSI A135.4	Basic Hardboard

E. The Engineer Wood Association (APA)

APA PS.1	(2019) Structural Plywood

F. American Welding Society (AWS)

AWS D1.4/D1.4M	(2018) Structural Welding Code - Reinforcing Steel

G. American Society for Testing and Materials (ASTM)

ASTM A185	(2017) Standard Specification for Welded Deformed Reinforcement, Plain, for Concrete
ASTM A615	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31	(2024b) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	(2023) Standard Specification for Concrete Aggregates
ASTM C39	(2024) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C94	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C138	(2023) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

ASTM C143	(2020) Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C150	(2022) Standard Specification for Portland Cement
ASTM C172	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C227	(2010) Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C231	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	(2010a; 2016) Air-Entraining Admixtures for Concrete
ASTM C311	(2024) Standard Test Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C494	(2019; E 2022) Standard Specification for Chemical Admixtures for Concrete
ASTM C567	(2019) Determining Density of Structural Lightweight Concrete
ASTM C618	(2023; E 2023) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C1017	(2013; E 2015) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1059	(2013) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1116	(2003) Standard Specification for Fiber-Reinforced Concrete and Shotcrete
ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

ASTM C1582	(2017) Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete
ASTM D5759	(2012; 2020) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses

H. Concrete Reinforcing Steel Institute (CRSI)

CRSI 10MSP	(2018; Errata 2019) Manual of Standard Practice

1.3 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Owner's Representative shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Shop Drawings

1. Reinforcing Steel: Reinforcing steel shop drawings shall conform to ACI MNL-66. Indicate bending and cutting diagrams, assembly diagrams, splicing placement and laps of bars, sizes, grades, shapes, dimensions, and details of bar reinforcing, supports, accessories, and concrete cover. Do not scale dimensions from project drawings to determine lengths of reinforcing bars. Only complete drawings will be accepted. Reproductions of contract drawings are unacceptable.

2. Formwork: Drawings showing details of formwork, including: joints, supports, studding and shoring, and sequence of form and shoring removal. Reproductions of contract drawings are unacceptable.

C. Product Data

1. Materials for Curing Concrete: Submit proposed materials and methods for curing concrete elements.

2. Materials for Placing and Curing Grout: Submit proposed materials and methods for placement and curing of miscellaneous grout installations.

3. Bonding Compound

4. Non-Shrink Grout

5. Adhesive Anchor System

D. Concrete Placement Procedures

1. Submit proposed concrete placement procedures prior to commencement of work. Include details of mixing, transporting, conveying, pumping, and finishing equipment. Also include proposed locations and details of construction joints. Submit a layout, by area, of concrete placement with a unique identification number for each pour. Submit to the Owner's Representative prior to commencing fabrication of reinforcement.

E. Design Data

1. Concrete Mix Design: Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, and admixtures; and applicable reference specifications. Provide mix proportion data for each type and strength of concrete required. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Owner's Representative. Submit additional data regarding concrete aggregates if the source of aggregate changes. Obtain acknowledgement of receipt prior to concrete placement.

F. Test Reports

1. Concrete Mix Design: Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that the mix will be suitable for the job conditions. Testing laboratories must conform to ASTM C1077. The laboratory test reports shall include mill test and all other tests for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

2. Cement: Submit test results in accordance with ASTM C150 for Portland cement. Submit current mill data.

3. Fly Ash: Submit test results in accordance with ASTM C311 for fly ash. Submit current mill data.

4. Admixtures: Submit test results in accordance with ASTM C494 and ASTM C1017 for concrete admixtures, and ASTM C260 for air-entraining agent. Submitted data shall be based upon tests performed within 6 months of submittal.

5. Aggregates: Submit test results for aggregate quality in accordance with ASTM C33, and the combined gradation curve for grading proposed for use in the work and used in the mixture qualification. Where there is potential for alkali-silica reaction, provide results of tests conducted in accordance with ASTM C227 or ASTM C1260. Submit results of all tests during progress of the work in tabular and graphical form as noted, describing the

cumulative combined aggregate grading and the percent of the combined aggregate retained on each sieve.

6. Compressive Strength Tests

7. Adhesive Anchor Pullout Retests: If required, submit certified test reports for pullout retests performed on embedded dowels that failed initial load tests (see Paragraph "FIELD QUALITY CONTROL").

G. Certificates

1. Concrete Placement: Submit technical literature for equipment and methods proposed for use in placing concrete. Include pumping or conveying equipment including type, size and material for pipe, valve characteristics, and the maximum length and height concrete will be pumped. No adjustments shall be made to the mixture design to facilitate pumping.

2. Form Removal Schedule: Submit schedule for form removal indicating element and minimum length of time for form removal. Submit technical literature of forming material or liner, form release agent, form ties, and gasketing to prevent leakage at form and construction joints. Provide a full description of materials and methods to be used to patch form-tie holes.

1.4 DEFINITIONS

A. "Cementitious material" as used herein includes all portland cement, pozzolan, fly ash, slag cement, and silica fume.

B. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the structure. A public location is accessible to persons not responsible for operation or maintenance of the structure.

1.5 MODIFICATION OF REFERENCES

A. Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or "may", wherever they appear. Interpret reference to the "Building Official", the "Structural Engineer", and the "Architect/Engineer" to mean the Designer or Owner's Representative.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver concrete until reinforcement and/or embedded items are in place and ready for concrete placement. ACI 301 for job site storage of materials. Protect materials from

contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

1. Reinforcement: Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure sizes can be accurately identified after bundles are broken and tags removed. Damaged bars as determined by the Owner or Owner's Representative as being unusable shall be replaced at the Contractor's expense.

PART 2 - PRODUCTS

2.1 MATERIALS FOR FORMS

A. Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood shall comply with APA PS 1, B-B concrete form panels or better, or ANSI A135.4, hardboard for smooth form lining. Virgin wood used shall be FSC-certified. Steel form surfaces shall not contain irregularities, dents, or sags. Other form liners may be used, as approved by the Owner's Representative, provided the smoothness and appearance of concrete produced will be equivalent to that produced by plywood concrete form panels.

B. Form Ties and Form-Facing Material: The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement and shall be of a design that will not permit form deflection and will not spall concrete during removal. Provide a form tie system that does not leave mild steel after break-off or removal any closer than 2" from the exposed surface. Form ties that are to be completely withdrawn shall be coated with a non-staining bond breaker. Form-facing material shall be structural plywood or other material that can absorb air trapped in pockets between the form and the concrete and some of the high water-cementitious materials ratio surface paste. Maximum use is three times. Provide forms with a form treatment to prevent bond of the concrete to the form.

C. Form Release Agent: Form release agent shall be colorless, biodegradable, and water-based, with a low VOC content. Product shall be commercial formulations that will not bond with, stain, or adversely affect concrete surfaces, and shall not impair subsequent treatments of concrete surfaces. The form release agent shall not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.2 CONCRETE

A. Contractor-Furnished Mix Design: The Contractor-furnished mix design shall be in accordance with ACI 211.1, ACI 301, ACI 318, and ACI 304.2R, except as otherwise specified. All concrete shall be normal weight concrete (142 pcf to 148 pcf). The compressive strength (f'c) of the concrete shall be as indicated and as specified below.

Location	f'c Min. 28-Day Comp. Strength (psi)	Aggregate ASTM C33 Maximum Nominal (Size No.)	Slump ASTM C143 Maximum Range (inches)	Water-Cement Maximum Ratio (by weight)	Exposure Class ACI 301
All Structural Concrete	5000	57	4	0.40	C1, F2 & S2

B. Slump: Maximum slump shall be 4 inches. Where an ASTM C494 Type F admixture is used, the slump, after the addition of the admixture, shall be no less than 6” or greater than 8”. Slump tolerances shall comply with the requirements of ACI 117.

C. Air Content: Concrete shall be air entrained and shall conform to the air limits specified in ACI 301.

1. Mix Proportions for Normal Weight Concrete: Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C192 and tested in accordance with ASTM C39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement by weight equivalency method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

D. Required Average Strength of Mix Design: Strength requirements shall be based on 28-day compressive strengths determined by using 6” diameter by 12” long cylindrical specimens fabricated in accordance with ASTM C192 and tested in accordance with ASTM C39. The specified compressive strength of the concrete (f'c) for each portion of the structure shall

meet the requirements as specified herein. The mix proportions for marine concrete shall be developed by the Contractor to produce the required design strength (f'c) and to provide durability, workability, and mixture consistency to facilitate placement, compaction into the forms and around reinforcement without segregation or bleeding. The requirements for durability consideration specified shall be incorporated into the mix proportions. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength shall be as follows:

1. For f'c between 3000 and 5000 psi, 1200 psi plus f'c.

2.3 MATERIALS

A. Cement: Cement shall comply with ASTM C150, Type I/II. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

B. Blended Cements: Blended cement must conform to AST C595/595M, Type IL, IP, IS, or IT including the optional requirement for sulfate resistance indicated by MS or HS designations. Any fly ash used in Type IP cement must be ASTM C618 Class F fly ash. A statement from the cement manufacturer indicating that the finished cement will not vary more than the percentage listed in Table 5 of ASTM C595/C595M with a 99 percent probability of compliance between lots or within a lot must be included in the Mixture Designs report. The type and percentage of supplementary cementitious materials or limestone used in the blend must not change from that submitted for the aggregate evaluation and mixture proportioning.

C. Fly Ash: Fly ash shall comply with ASTM C618, Class F, except that the maximum calcium oxide content shall be 8 percent, the maximum available alkalis shall be 1.5 percent, and the maximum allowable loss on ignition shall be 6 Percent. Report the chemical analysis of the fly ash in accordance with ASTM C311. Evaluate and classify fly ash in accordance with ASTM D5759. Add fly ash with cement.

D. Water: Water shall comply with the requirements of ASTM C94, and the chloride and sulfate limits in accordance with ASTM D512 and ASTM D516. Minimize the amount of water in the mix. The amount of water shall not exceed 40 percent by weight of cementitious materials, and in general, workability shall be improved by adjusting the grading rather than by adding water. Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

E. Aggregates: Aggregates shall conform to ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Provide aggregates for exposed concrete from one source. Do not provide aggregates that react deleteriously with alkalis in cement.

F. Synthetic Fibers: In addition to the requirements specified above, the cast-in-place concrete sheet pile cap shall include microsynthetic fibers in accordance with ASTM C1116 at a dosage rate of 1.5 lbs/yd^3. Fibers shall be MasterFiber®M 100 by BASF, PSI Fiberstrand F by Euclid Chemical, SikaFiber® PPM 150 by Sika, or approved equal. Fibers shall be added at the batch plant and uniformly dispersed in concrete mixture as recommended by the manufacturer.

G. Non-Shrink, Non-Metallic Grout: Non-shrink, non-metallic grout shall conform to ASTM C1107, salt and seawater resistant with a compressive strength of 7000 psi at 7 days in accordance with ASTM C109 and a bond strength of 2000 psi per ASTM C882. Grout material is to be used as indicated in the project drawings.

H. Admixtures: Admixtures shall conform to ASTM C494 Type A for water reducing, Type B for retarding, Type C for accelerating, Type D for water reducing and retarding, and Type E for water reducing and accelerating admixture. Do not use calcium chloride admixtures.

1. Air-Entraining: Provide air-entraining admixtures conforming to ASTM C260.

2. High Range Water Reducer (HRWR) (Superplasticizers): If required, provide high range water reducers (superplasticizers) conforming to ASTM C494, Type F and ASTM C1017.

3. Use a corrosion-inhibiting admixture conforming to ASTM C1582 for all bulkhead cap concrete.

4. Use a shrinkage-reducing admixture conforming to ASTM C494, Type S for all bulkhead cap concrete.

I. Materials for Curing Concrete/Grout: Use water-based curing compounds with low VOC content in accordance with ACI 301 and ACI 308.1.

1. Impervious Sheeting: Impervious sheeting shall conform to ASTM C171 and shall consist of waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2. Pervious Sheeting: Pervious sheeting shall conform to AASHTO M 182.

J. Bonding Compound: Bonding compound shall conform to ASTM C1059, Type II.

2.4 REINFORCEMENT

A. Reinforcing Bars: Reinforcing bars shall conform to ACI 301 and ASTM A615, Grade 60 with the bars marked A, S, or W, unless otherwise specified. Any reinforcing bars that require welding shall conform to ASTM A706, Grade 60.

B. Reinforcing Bar Supports: Provide bar ties and supports of coated or non-corrodible material. Wire ties shall be 16 gauge or heavier. Bar supports for formed surfaces shall be designed and fabricated in accordance with ACI MNL-66 and CRSI 10MSP.

PART 3 - EXECUTION

3.1 FORMS

A. Formwork shall be in accordance with ACI 301 and ACI 347. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Forms shall be adequately supported to produce concrete surfaces within tolerance as specified. Chamfer exposed joints, edges, and external corners of concrete 3/4", unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight. Formwork shall be gasketed or otherwise rendered sufficiently tight to prevent leakage of paste or grout under heavy, high-frequency vibration. Use a release agent that does not cause surface dusting. Patch form tie holes with a non-shrink patching material in accordance with the manufacturer's recommendations and subject to approval. Stay-in-place forms will not be permitted.

B. Coating: Before concrete placement, coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied. The Contractor shall be responsible for the proper handling, disposal, and spill response of on-site coating activities.

C. Removal of Forms and Supports: After placing concrete, forms shall remain in place for the time periods specified in ACI 347, except for concrete placed underwater, forms shall remain in place 48 hours. Prevent concrete damage during form removal. Clean all forms immediately after removal.

1. Special Requirements for Reduced Time Period: Forms may be removed earlier than specified if ASTM C39 test results of field-cured samples from a representative portion of the structure or other approved and calibrated non-destructive testing techniques indicate that the concrete has reached a minimum of 85 percent of the design strength.

D. Reshoring: Do not allow construction loads to exceed the superimposed load which the structural member, with necessary supplemental support, is capable of carrying safely and without damage. Reshore concrete elements where forms are removed prior to the specified time period. Do not permit elements to deflect or accept loads during form stripping or reshoring. Forms on load-bearing members may be stripped after 2 days if loads are not applied to the members. After forms are removed, slabs and beams over 10 feet in span and cantilevers over 4 feet shall be reshored for the remainder of the specified time period in accordance with Section 3.1.C entitled "REMOVAL OF FORMS AND SUPPORTS". Perform reshoring operations to prevent subjecting concrete members to overloads, eccentric loading, or reverse bending. Reshoring elements shall have the same

load-carrying capabilities as original shoring and shall be spaced similar to original shoring. Firmly secure and brace reshoring elements to provide solid bearing and support.

E. Reuse: Reuse forms provided the structural integrity of concrete and the aesthetics of exposed concrete are not compromised. Surfaces of forms to be reused shall be cleaned of mortar from previous application and of all other foreign material before reuse. Limit reuse of plywood to no more than three times. Reuse may be further limited by the Owner's Representative if it is found that the pores of the plywood are clogged with paste to the degree that the wood does not absorb the air or the high water-cementitious materials ratio concrete surface.

3.2 FORMED SURFACES

A. Tolerances: Tolerances shall be in accordance with ACI 347 and as indicated.

B. As-Cast Form: Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

3.3 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

A. Placing reinforcement shall be in accordance with ACI 301 and ACI MNL-66. Provide bars, wire fabric, wire ties, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

B. Reinforcement Supports: Place reinforcement and secure with galvanized or non-corrodible chairs, spacers, or metal hangers.

C. Splicing: Splice reinforcement as indicated. Splices not indicated shall be in accordance with ACI 301. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches. Welded splices shall be approved prior to use and shall conform to AWS D1.4.

D. Cover: Minimum reinforcement cover shall be as indicated in the Contract Drawings. For cover dimensions not indicated in drawings, provide 3 inches clear cover or as in accordance with ACI 301, whichever is greater. Dimensional tolerance for clear cover shall be ¼".

E. Construction Joints: Construction joints will be permitted as indicated on the drawings.

3.4 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

A. Batching, measuring, mixing, and transporting concrete shall conform to ASTM C94, ACI 301, ACI 302.1R, and ACI 304R, except as modified herein. Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

B. Measuring: Make measurements at intervals as specified in Sections 3.8.B "SAMPLING" and 3.8.C "TESTING" below.

C. Mixing: Mixing shall be in accordance with ASTM C94 and ACI 301. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 84 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

D. Transporting: Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete, which has segregated in transporting and dispose of as directed.

3.5 PLACING CONCRETE

A. Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Do not permit cold joints to occur.

B. Vibration: Concrete vibration shall be in accordance with ACI 301. Furnish a spare vibrator on the job site whenever concrete is placed. Consolidate concrete with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Operate vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use

vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18 inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

C. Application of Bonding Compound: Apply a thin coat of compound to dry, clean surfaces. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is stringy. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy resins.

D. Pumping: Concrete pumping shall be in accordance with ACI 304R and ACI 304.2. Pumping shall not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment shall not exceed 2 inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy. Rapid changes in pipe sizes shall be avoided. Maximum size of course aggregate shall be limited to 33 percent of the diameter of the pipe. Maximum size of well-rounded aggregate shall be limited to 40 percent of the pipe diameter. Samples for testing shall be taken at both the point of delivery to the pump and at the discharge end.

E. Cold Weather: Proceed in accordance with ACI 306.1 and ACI 306. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

F. Hot Weather: Proceed in accordance with ACI 305. Maintain required concrete temperature using Figure 2.1.5 in ACI 305 to prevent the evaporation rate from exceeding 0.2 pounds of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6 CONCRETE SURFACE FINISHES AND MISCELLANEOUS CONSTRUCTION

A. Concrete surface finishes shall be in accordance with ACI 302.1R, unless otherwise specified.

B. Finish: Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Grate tampers ("jitterbugs") shall not be used.

1. Floated: Use for bulkhead concrete cap. Finish concrete in accordance with ACI 301 section 5 for a floated finish.

2. Broomed: Use for concrete promenade, terraced seatings, and plaza slabs. Perform a floated finish, then draw a broom or burlap belt across the surface to produce a coarse scored texture. Permit the surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.7 CURING AND PROTECTION

A. Curing and protection shall be in accordance with ACI 301, unless otherwise specified. Avoid damage to concrete from vibration created by movement of equipment in the vicinity, and any other activity resulting in vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period.

B. Moist Curing: Remove water without erosion or damage to the structure.

1. Ponding or Immersion: Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

2. Fog Spraying or Sprinkling: Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3. Pervious Sheeting: Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting a minimum of 6” over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete or over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

4. Impervious Sheeting: Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12” minimum. Provide sheeting not less than 18” wider than the concrete surface to be cured. Secure edges

and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting.

C. Curing Periods: Curing periods shall be in accordance with ACI 301, except 21 days for concrete that will be in full-time or intermittent contact with alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Owner's Representative.

3.8 FIELD QUALITY CONTROL

A. An independent testing agency will be selected and paid for by the Owner. The Contractor shall be responsible for the scheduling and coordination of the work performed by the testing laboratory. Testing services must be scheduled a minimum of 24 hours in advance.

B. Sampling: Sampling shall be in accordance with ASTM C172. Collect samples of fresh concrete to perform tests specified. Refer to ASTM C31 for making test specimens.

C. Testing

1. Slump Tests: Slump tests shall conform to ASTM C143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 50 cubic yards (maximum) of concrete.

2. Temperature Tests: Test the concrete delivered and in the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3. Compressive Strength Tests: Compressive strength tests shall conform to ASTM C39. Make five test cylinders for each set of tests in accordance with ASTM C31. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each mix design and for concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yards of concrete. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C42 core samples from the in-

place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. The Contractor shall pay for all additional tests when failing concrete is verified. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with non-shrink grout. Match color and finish of adjacent concrete.

4. Air Content: Air content shall conform to ASTM C173 or ASTM C231 for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

5. Unit Weight of Structural Concrete: Tests of the unit weight of structural concrete shall conform to ASTM C567 and ASTM C138. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

6. Adhesive Anchor Testing: The Owner's independent testing agency will conduct a pullout test on a random sampling of 5 percent of the embedded anchors at each application. The anchors shall be loaded to twice the design load to ensure proper load carrying capability. If an embedded dowel fails, then a second test shall be conducted at an adjacent location. If two (2) anchors in any single application fail, then all of the embedded anchor locations within the immediate vicinity of the failure shall be tested at the Contractor's expense. Any anchors that fail load tests shall be replaced at the Contractor's expense. Additional pullout tests shall be conducted on the reinstalled anchors. All additional work associated with failed anchors shall be performed at the Contractor's expense. The Contractor shall submit certified test reports for all retested embedded anchors.

END OF SECTION 03 30 00

SECTION 05 50 13 – MISCELLANEOUS METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists the furnishing of all material and equipment as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to complete fabrication and installation of miscellaneous metal fabrication and steel framing as indicated on the project drawings and specified herein.

B. The Contractor shall coordinate the requirements of all fabricated, embedded, and attached devices, including but not limited to mooring cleats, anchorages, structural framing, and all other items, indicated or not, requiring embedment and/or accommodation of devices made integral with the work.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Institute of Steel Construction (AISC)

AISC 303	(2022) Code of Standard Practice for Structural Steel Building and Bridges

C. American Society for Nondestructive Testing (ASNT)

ASNT SNT-TC-1A	Recommended Practice

D. American Society for Testing and Materials (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A53/A53M	(2024) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123	(2017) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	(2023) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel

ASTM A780	(2023) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992	Structural Steel Shapes
ASTM F1554	(2020) Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength
ASTM F3125	(2022) Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Tensile Strength

E. American Welding Society (AWS)

AWS D1.1	Structural Welding Code Steel
AWS D3.6	Underwater Welding Code
AWS QC1	AWS Certification of Welding Inspectors

F. Federal Specifications (FS)

FS TT-P-664	Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

G. Military Specifications and Standards

MIL-PRF-907	Anti-seize Thread Compound, High Temperature

H. Society for Protective Coatings (SSPC)

SSPC-SP1	Solvent Cleaning
SSPC-SP6	Commercial Blast Cleaning

1.3 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00, “Submittals” of these Specifications. Note that approval of submittals by the Engineer shall not be construed as relieving the Contractor from responsibility for compliance with the Specifications nor from responsibility of errors of any sort in the submittals.

B. Certifications, test procedures, and other submittals shall show the appropriate ASTM test(s) for each material.

C. Shop Drawings

1. Provide fabrication and erection details of each metal fabrication. Include plans, elevations, sections, connections to structural system, weld details, and anchoring details as specified in AISC 303. Submit templates, erection, and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the construction. Provide drawings of any connections required that are not detailed. Indicate welded connections with welding symbols in accordance with AWS standards. Indicate net weld lengths.

D. Product Data

1. Adhesive and Mechanical (Expansion) Anchors

2. Anchor bolts

3. Mooring cleats

4. Welding of structural steel, as applicable

E. Drawings

1. Mooring cleats and anchorage

2. Utility Stanchions

3. Framing for overlook platform

1.4 QUALIFICATION OF WELDERS

A. Qualify welders in accordance with AWS D1.1, using procedures, materials, and equipment of the type required for the work.

1.5 QUALITY ASSURANCE

A. Welding Procedures, Welders and Welder Qualifications: Develop and qualify procedures for welding metals included in the work. Do not start welding until welding procedures, welders, and welding operators have been qualified. Perform qualification testing by a Certified Weld Inspector (CWI) or testing laboratory approved by the Owner's Representative. Notify the Owner's Representative at least 24 hours in advance of the time and place of the tests. When practicable, perform the qualification tests at or near the work site. Maintain current records of the test results obtained in welding procedure, welder and welding operator performance qualifications, and nondestructive examination (NDE) procedures. These records shall be readily available at the site for examination by the Owner's Representative. Qualify the procedures for making transition welds between different materials or between plates or pipes of different wall thicknesses. The choice of welding process shall be the responsibility of the Contractor.Supplement C-Ultrasonic.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Materials delivered to the site shall be new and undamaged and shall be accompanied by certified test reports. Provide the manufacturer's logo and mill identification mark on the materials as required by the referenced specifications. Store and handle materials in the manner recommended by the manufacturer and/or fabricator to prevent permanent deflection, damage to coatings, corrosion prior to installation, and distortion or damage including cracks, nicks, slips, gouges, and other types of damage. Storage should also allow for required inspection activities. All damaged items determined by the Owner or Owner's Representatives as being unusable shall be replaced at the Contractor's expense.

B. Keep steel members off the ground by using pallets, platforms, or other supports. Store fasteners in a protected place. Clean and lubricate bolts and nuts that become dry or rusty before use. Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

C. Weld Material: Deliver filler metals, electrodes, fluxes, and other welding materials to the site in manufacturer's original packages and store in a dry space until used. Label and design packages properly to give maximum protection from moisture and to assure safe handling.

1.7 ENVIRONMENTAL

A. Do not perform welding when the quality of the completed weld could be impaired by the prevailing work or weather conditions per AWS D1.1. The approved weld inspector will determine when the weather or working conditions are unsuitable for welding.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All permanent metal components shall be hot dip galvanized after fabrication.

B. Anchor Bolts, Nuts and Washers

1. Anchor bolts for Mooring Cleats shall conform with the requirements of ASTM F1554, Grade 55 or better, as required by design.

2. Anchor bolts unless otherwise noted or specified, shall conform to ASTM F1554, Grade 55. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

3. Bolts and Nuts: ASTM F3125/F3125M, Grade A325.

C. Structural Carbon Steel: ASTM A992 or ASTM A572, Grade 50.

D. Mooring Cleats

1. Material

a. Mooring cleats shall be new, cast steel cleats. Cleat material shall be stress-relieved cast steel conforming to ASTM A27, Grade 65-35 or better. Minimum capacity of the cleat shall be 8 tons in the direction of -15° to 60° relative to horizontal and 0° to 180° relative to the front face of structure. The theoretical point of loading for the line pull shall be the intersection of the cleat vertical axis centerline and the horizontal axis running through the center of the horns. The factor of safety against yielding shall be 2.0.

b. Anchor bolts shall be as specified in the drawings.

2. Protective Coating

a. Mooring cleats shall be galvanized.

2.2 FABRICATION FINISHES

A. Galvanize: All permanent steel fabrications and hardware, unless indicated otherwise.

B. Galvanizing

1. Bolts, Nuts, and Washers: ASTM A153, Class C or D as applicable

2. Plates and Structural Shapes: ASTM A123, Thickness Grade 100

3. Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable

C. Surface Preparation: Blast clean surfaces in accordance with SSPC-SP6. Clean surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents in accordance with SSPC-SP1. Steel to be embedded in concrete shall be free of dirt and grease. Do not galvanize bearing surfaces, including contact surfaces within friction-type joints, but coat with rust preventative applied in the shop.

D. Repair of Zinc-Coated Surfaces: Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780 or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved by the Owner's Representative. Clean areas to be repaired and remove the slag from the welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

E. Nonferrous Metal Surfaces: Protect by plating, anodic, or organic coatings.

2.3 MISCELLANEOUS PLATES AND SHAPES

A. Provide for items that do not form a part of the structural steel framework, such as miscellaneous mountings, frames, and connections. Provide with connections and fastener welds as indicated.

2.4 CONNECTIONS

A. Welds

1. Welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator using qualified welding procedures.

B. Bolted Connections

1. Provide bolts, nuts and washers of the type specified or indicated. Use beveled washers where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated, the materials, workmanship and installation shall conform to the applicable provisions of ASTM A325.

2. Bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical. Holes for high strength bolts shall not have diameters more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts, the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly shall not distort the metal or enlarge the holes. Reaming to a larger diameter of the next standard size bolt will be allowed for slight mismatching.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

A. Fabrication: Prior to shipment, all miscellaneous metal fabrications shall be examined by the fabricator and/or manufacturer for compliance with the appropriate requirements of this Specification. Noncompliance with any specified requirement or presence of any defects preventing or lessening maximum efficiency shall constitute cause for rejection.

B. The Contractor shall examine each miscellaneous metal fabrication prior to installation and note any damage or defects. Any rejected material shall be segregated and removed from the project site. Any material damaged during Contractor handling and installation shall be repaired in accordance with manufacturer's recommendations or replaced at no additional cost to the Owner.

3.2 INSTALLATION

A. Install items at locations indicated, according to manufacturer's instructions.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

A. Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated: expansion shields or adhesive anchors for concrete; machine and carriage bolts for steel. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 BUILT-IN WORK

A. Form for anchorage metal work built-in with concrete or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.5 FINISHES

A. Galvanize items as indicated on the Contract Drawings and as specified herein. Surfaces shall be cleaned per the coating manufacturer's recommendations.

B. Field Preparation: Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

C. Environmental Conditions: Do not clean or paint surfaces when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Engineer.

D. Dissimilar Materials: Where dissimilar metals are in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

3.6 BOLTED CONSTRUCTION

A. Field treat damaged galvanized finish with two coats of high zinc dust oxide paint, cold galvanizing compounds or approved equal conforming to the requirements of ASTM A 780. In addition, all exposed threaded surfaces shall be painted with two coats of high zinc dust oxide paint after installation of unit.

B. Anti-Seize Compound: The Contractor shall coat threads of all attachment bolts with an anti-seize compound, conforming to MIL-PRF-907, prior to applying washers and nuts. Recoat any bolt thread projection beyond nut after final tightening.

3.7 WELDING

A. Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1 unless noted below. Use continuous welds on all exposed connections. Grind visible welds smoothly in the finished installation.

B. Welding: Do not deviate from applicable codes, approved procedures and approved shop drawings without prior written approval from the Engineer. Materials or components with welds made off the site will not be accepted if the welding does not conform to the requirements of this Specification unless otherwise specified. Assign each welder or welding operator an identifying number, letter, or symbol that shall be used to identify his welds. Each welder or welding operator shall apply his mark adjacent to his weld using an approved rubber stamp or felt-tipped marker with permanent, weatherproof ink or other approved methods that do not deform the metal. For seam welds, place identification marks adjacent to the welds at 3-foot intervals. Confine identification by die stamps or electric etchers to the weld reinforcing crown, preferably in the finished crater.

C. Welding Operators: Perform welding in accordance with qualified procedures using qualified welders and welding operators.

D. Examinations and Tests

1. The Contractor is responsible for providing all required shop fabrication weld tests.

2. Visual and nondestructive examinations shall be performed by a third party AWS Certified Welding Inspector (CWI) qualified and certified in accordance with the provisions of AWS QC1, Standard for Qualification and Certification of Welding Inspectors to detect surface and internal discontinuities in completed welds. The CWI shall be approved by the Engineer prior to the start of welding operations. Visual and ultrasonic examination shall be required as specified. When examination and testing indicates defects in a weld joint, a qualified welder shall repair the weld in accordance with the Paragraph “Corrections and Repairs” of this Section.

3. Visual Examination: Visually examine 100% of welds as follows:

a. Before Welding: For compliance with requirements for joint preparation, placement of backing rings or consumable inserts, alignment and fit-up, and cleanliness.

b. During Welding: For conformance to the qualified welding procedure.

c. After Welding: For cracks, contour and finish, bead reinforcement, undercutting, overlap, and size of filet welds.

4. Nondestructive Examination (NDE): NDE shall be in accordance with written procedures. Procedures for ultrasonic tests and methods shall conform to AWS D1.1 and for underwater welding procedures for ultrasonic tests and methods shall conform to AWS D3.6. In addition to the information required in AWS, the written procedures shall include:

    a. Timing of the nondestructive examination in relation to the welding operations

    b. Safety precautions

5. 10 Percent NDE: All steel welding shall be subjected to 10 percent NDE unless noted otherwise. Additional testing may be required if unsatisfactory results are obtained.

E. Acceptable Standards

1. Visual: The following indications are unacceptable:

    a. Cracks – external surface

    b. Undercut on surface which is greater than 1/32 inch deep

    c. Lack of fusion on surface

    d. Convexity of filet weld surface greater than 10 percent of longest leg plus 1/32 inch

    e. Concavity in fillet welds greater than 1/16 inch

    f. Fillet weld size less than indicated or greater than 1-1/4 times the minimum specified filet leg length

2. Ultrasonic Examination: Linear type discontinuities are unacceptable if the amplitude exceeds the reference level and discontinuities have lengths which exceed 3/4-inch. Discontinuities interpreted to be cracks, lack of fusion, or incomplete penetration are unacceptable regardless of length.

F. Corrections and Repairs

1. Remove defects and replace welds as specified. Repair defects discovered between weld passes before additional weld material is deposited. Wherever a defect is removed, repair by welding is required, and the affected area shall be blended into the surrounding surface eliminating sharp notches, crevices, or corners. After defect removal is complete and before rewelding, reexamine the area by the same test methods which first revealed the defect to ensure that the defect has been eliminated. After rewelding, reexamine the repaired area by the same test methods originally used for that area. For repairs to base material, the minimum examination shall be the same as required for butt welds. Indication of a defect shall be regarded as a defect unless reevaluation by NDE or by surface conditioning shows that no unacceptable indications

are present. The use of foreign material to mask, fill in, seal, or disguise welding defects will not be permitted.

3.8 FIELD QUALITY CONTROL

A. Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Engineer shall be notified in writing of defective welds within 7 working days of the date of the weld inspection.

B. Welds

1. Visual Inspection: AWS D1.1. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet welds and returns.

2. Non-Destructive Testing: If more than 20% of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the Engineer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

END OF SECTION 05 50 13

SECTION 06 13 33 – TIMBERWORK

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of fabrication and installation of timberwork for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall all material and equipment and the performing of all labor necessary to complete fabrication and installation of timberwork associated with the timber members, connections, and fasteners for the pier as shown on the Contract Drawings and as herein specified or directed by the Owner's Representative.

1.2 RELATED SECTIONS

A. Section 05 50 13 Miscellaneous Metal Fabrications

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Softwood Lumber Standard (ALSC)

ALSC PS 20	American Softwood Lumber Standard

C. American Wood Protection Association (AWPA)

AWPA M4	Standard for the Care of Preservative-Treated Wood Products
AWPA M6	Brands Used on Forest Products
AWPA P34	Standard for Copper Naphthenate, Waterborne
AWPA T1	Use Category System: Processing and Treatment Standard
AWPA U1	User Specification for Treated Wood

D. American Society for Testing and Materials (ASTM)

ASTM A48/A48M	Standard Specification for Gray Iron Castings
ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
ASTM D7031	(2011; R 2019) Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products
ASTM D7032	(2021) Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails

1.4 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00, "Submittals" of these Specifications. Note that approval of submittals by the Owner's Representative shall not be construed as relieving the Contractor from responsibility for compliance with the Specifications nor from responsibility of errors of any sort in the submittals. Certifications, test procedures, and other submittals shall show the appropriate ASTM test(s) for each material.

B. Shop Drawings

1. Pier and Boardwalk Timberwork: Submit drawings of treated timber showing dimensions of cut, framed, or bore timbers and trusses.

C. Test Reports

1. Timber Preservative Inspection

2. Delivery Inspection List

D. Certificates

1. Preservative Treatment MSDS and CIS

2. Certificates of Grade

1.5 DELIVERY AND STORAGE

A. Open-stack untreated timber and lumber material on skids at least 12 inches aboveground, in a manner that will prevent warping and allow shedding of water. Close-stack treated timber and lumber material in a manner that will prevent long timbers or pre-framed material from sagging or becoming crooked. Keep ground under and within 5 feet of such timber and lumber free of weeds, rubbish, and combustible materials. Protect materials from weather. Handle treated timber with ropes or chain slings without dropping, breaking

outer fibers, bruising, or penetrating surface with tools. Do not use cant dogs, peaveys, hooks, or pike poles. Protect timber and hardware from damage.

1.6 QUALITY ASSURANCE

A. The Contractor must be responsible for the quality of treated wood products. The Contractor must provide the Owner's Representative with the inspection report of an independent inspection agency, certifying that the offered products comply with applicable AWPA standards. Identify treatment on each piece by the quality mark of an agency accredited by the Board of Review of the American Lumber Standard Committee (ALSC). Inspect all preservative-treated wood visually to ensure there are no excessive residual materials or preservative deposits. Material must be clean and dry or it will be rejected because of environmental concerns.

B. MSDS and CIS: Provide Material Safety Data Sheets (MSDS) and Consumer Information Sheets (CIS) associated with timber preservative treatment. Contractor shall comply with all safety precautions indicated on MSDS and CIS.

C. Delivery Inspection List: Field inspect and submit a verification list of each treated timber member and each strapped bundle of treated lumber indicating the wording and lettering of the quality control markings, the species and the condition of the wood. Do not incorporate materials damaged in transport from plant to site. Inspect all preservative-treated wood, visually to ensure there are no excessive residual materials or preservative deposits. Material shall be clean and dry or it will be rejected due to environmental concerns.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Solid Sawn Lumber and Timbers: Provide solid sawn lumber and timbers of stress-rated Southern Pine, with a stress rating as indicated, and identified by the grade mark of a recognized association or independent inspection agency using the specific grading requirements of an association recognized as covering the species used. The association or independent inspection agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Design, fabrication, and installation of wood construction materials shall conform to NFP specifications for wood construction.

1. Boardwalk and Platform Framing Lumber: Each piece of lumber shall be identified by grade stamp of an ALSC accredited Inspection Bureau. Framing lumber shall be S4S Grade No. 1 Southern Yellow Pine manufactured in accordance with ALSC PS 20.

B. Composite Decking: Decking material on all boardwalks must be suitable for the marine environment and provide a non-slip walking surface. All decking must be free of extra holes, broken screws, and misaligned screw drive lines. Decking must consist of 2x6 composite timber decking boards, by Weardeck or approved equal, color Sand.

C. Preservative Treatment: Fabricate lumber and timbers before preservative treatment. Each piece of treated lumber or timber shall be branded, by the producer, in accordance with AWPA M6. The type of preservative, retention, and penetration must be based on Use Category and species and in accordance with AWPA U1 and AWPA T1. The Contractor must be responsible for the quality of treated wood products.

D. Field Treatment: Timber cuts must be field treated in accordance with AWPA M4. All cuts, holes and injuries such as holes from removal of spikes or nails which may penetrate the treated zone must be field treated with copper naphthenate conforming to AWPA P34.

E. Fasteners: Timber hardware must consist of bolts with necessary nuts and washers, proprietary timber connectors with necessary fasteners, stainless steel screws and other fastenings. Hot-dip galvanize all non stainless steel hardware in accordance with ASTM A123/A123M or ASTM A153/A153M, as applicable.

1. Provide cast-iron ogee, malleable iron washers in accordance with ASTM A48.

2. Bolts, nuts, and washers shall conform to ASTM A307, Hot Dip Galvanized, unless otherwise noted on the drawings. Provide bolts with washers under nut and head. Provide timber connectors and other metal fastenings of type and size shown.

3. Provide screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate. Screws shall be Type 316 Stainless Steel and size #10 or greater.

4. Nails: Hot Dip Galvanized

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Cut, bevel, and face timbers prior to plant preservative treatment and prior to installing any hardware. Provide protective equipment for personnel fabricating, field treating, or handling materials treated with creosote or water-borne salts. Refer to paragraph entitled "MSDS and CIS."

B. Counter sink for fasteners as indicated. Holes deeper than required will be rejected and wale members replaced at no additional cost to the government. After tightening of the nuts on the anchor rods, only 1/4" - 3/8" of threads should remain exposed. Provide a thread adhesive to ensure the nuts do not become loose.

C. Composite Decking: Cutting of composite decking must be done with a carbide-tipped saw blade to maintain clean-cut edges. Edges of boards must be aligned with no variation in length from one board to the next. Deck planks must be placed perpendicular to the stringers.

D. Framing: Cut and frame lumber and timber so that joints will fit over contact surface. Secure timbers and in alignment. Open joints are unacceptable. Shimming is not allowed. Bore holes for bolts with a bit 1/16 inch larger in diameter than bolt. Bore holes for lag screws in two parts. Make a lead hole for shank the same diameter as shank. Make a lead hole for the threaded portion approximately two-thirds of the shank diameter. Counter bore for countersinking wherever smooth faces are indicated or specified.

E. Caps: Prior to placing caps, prepare tops of piles according to paragraphs entitled, "Field Treatment." Place timber caps to secure bearing over tops of supporting piles and to secure even alignment of their ends.

F. Stringers: Place crown up and, if possible, the better edge of deck stringers down. Tops of stringers shall not vary from a plane more than will permit bearing of the floor on stringers. Lap stringers to take bearing over full width of cap or floor beam at each end. Break joints if stringers cover two spans. Bolt stringers as indicated. Stringers may be of sufficient length to cover two spans, except on sharp horizontal curves. Between stringers, frame and nail solid-bridging at each end as indicated. Make size and spacing of bridging as indicated.

G. Fastening: Vertical bolts shall have nuts on the lower end. Where bolts are used to fasten timber to timber or timber to steel, bolt members together when they are installed and retighten immediately prior to final acceptance of contract. Provide bolts having sufficient additional threading to provide at least 3/8 inch per foot thickness of timber for future retightening. Provide timber connectors of types indicated. Burr end of bolt after installation.

3.2 FIELD TREATMENT

A. Timberwork: Field treat cuts, bevels, notches, re-facing and abrasions made in the field in treated timbers in accordance with AWPA M4, MSDS and CIS. Wood preservatives are restricted use pesticides and shall be applied according to applicable standards. Trim cuts and abrasions before field treatment. Paint depressions or openings around bolt holes, joints, or gaps including recesses formed by counterboring, with preservative treatment used for timber; and after bolt or screw is in place, fill with hot pitch or a bitumastic compound.

B. Piling and Post Protection: In accordance with AWPA M4, immediately after pile or post tops are cut off and prior to placement of pile cap, protect pile or post top with several heavy applications of the same preservative used to treat the pile or post, or else copper naphthenate solutions containing a minimum of 2 percent copper metal may be used with treated products. Seal ends with a heavy application of coal-tar pitch or other appropriate sealer.

END OF SECTION 06 13 33

SECTION 09 97 13 – COATING OF STEEL WATERFRONT STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of placing requirements for materials and installation of protective coatings on steel structures and other miscellaneous and incidental items as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to complete the coating work as indicated on the project drawings and specified herein.

1.2 RELATED SECTIONS

A. Section 31 41 16 Metal Sheet Piling

B. Section 31 62 15 Steel Pipe Piles

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Institute of Steel Construction (AISC)

AISC SPE	Sophisticated Paint Endorsement

C. American Society for Testing and Materials (ASTM)

ASTM D7091	Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nondestructive Coatings Applied to Non-Ferrous Metals
ASTM E376	Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

D. The Society for Protective Coatings (SSPC)

SSPC PS 12.01	One Coat Zinc-Rich Painting System
SSPC Paint 20	Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)
SSPC Paint 36	Two-Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based

SSPC QP 3	Evaluating Qualifications of Shop Painting Applicators
SSPC SP 1	Solvent Cleaning
SSPC SP 10/NACE No. 2	Near-White Blast Cleaning

1.4 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00 Submittals of these Specifications. Note that approval of submittals by the Owner's Representative shall not be construed as relieving the Contractor from responsibility for compliance with the Specifications nor from responsibility of errors of any sort in the submittals.

B. Product Data

1. Coating material manufacturer's data

2. Coating material manufacturer's application instructions

C. Procedures

1. Coating repair procedures

2. Quality control procedures

D. Inspection Reports

1. Dry film thickness measurements

2. Holiday test results

E. Certificates

1. Shop coating contractor qualifications

2. Shop coating inspector qualifications

1.5 QUALITY ASSURANCE

A. Shop coating Contractor shall possess a current SSPC QP 3 or AISC SPE certification. Application of coating in the shop and in the field shall be done under the supervision of an experienced coating inspector. Contractor shall submit Coating Manufacturer/Installer dry film thickness measurements and holiday testing results prior to delivery of steel pile or pipe to site. Contractor shall visually inspect steel pile and pipe for damaged coating prior to installation. Testing and inspection shall be in accordance with paragraph titled "Quality Control" of this section.

1.6 ENVIRONMENTAL CONDITIONS

A. Start work only when ambient and curing temperatures are within limits of coating manufacturer's recommendations and at least 5 degrees F above dew point temperature.

1.7 SAFETY AND HEALTH PRECAUTIONS

A. Materials listed in this section contain coal tar pitch volatiles, which are toxic. Follow safety procedures as recommended by the manufacturer. Work in a well-ventilated area. Provide, and require workers to use impervious clothing, gloves, face shields (8-inch minimum), and other appropriate protective clothing necessary to prevent eye and skin contact with coating materials. Keep coatings away from heat, sparks, and flame.

PART 2 - PRODUCTS

2.1 COATING SYSTEMS

A. Coating: Provide the coating systems specified herein or an approved equal.

1. Primer: Organic Zinc-Rich Primer (Carboline Carbozinc® 859 or approved equivalent)

    a. System: SSPC PS 12.01

    b. Paints: SSPC Paint 20, Type II (Organic)

    c. Dry Film Thickness: 3 to 5 mils

2. Intermediate Coat: Epoxy-Polyamide (Carboline Carboguard® 60 or approved equivalent)

    a. Color: Dark Gray

    b. Dry Film Thickness: 4 to 6 mils

3. Top Coat: Acrylic Polyurethane (Carboline Carbothane® 134 HG or approved equivalent)

    a. Paints: SSPC Paint 36

    b. Color: Black

    c. Dry Film Thickness: 2 to 3 mils

PART 3 - EXECUTION

3.1 CLEANING AND PREPARATION OF SURFACES

A. Solvent Cleaning: SSPC SP 1. Remove visible oil or grease first by scraper. Then remove the remaining oil and grease by wiping or scrubbing the surface with rags or brushes wetted with solvent. Use clean solvent and clean rags or brushes for the final wiping.

B. Blast Cleaning: SSPC SP 10/NACE No. 2. After solvent cleaning, complete surface preparation by near-white blast cleaning. Remove residual dust from blasted surface by blowing with dry, oil-free air, vacuuming, or sweeping. Provide surface profile of at least 1 1/2-mil thickness.

C. Additional Preparation: After blast cleaning, surface imperfections that remain shall be removed as necessary to provide a holiday free coating. After blast cleaning and any additional preparation, remove visible oil, grease, and drawing and cutting compounds by solvent cleaning in accordance with SSPC SP 1.

3.2 PROPORTIONING AND MIXING OF COATING SYSTEM

A. Proportioning of Organic Zinc-Rich Primer System: Mix and thin in accordance with manufacturer's recommendations.

B. Proportioning of Epoxy-Polyamide System: Proportion per manufacturer’s recommendations.

C. Mixing of Epoxy-Polyamide System: Mix per manufacturer's recommendations.

3.3 COATING APPLICATION

A. General: Apply primer coating to dry surfaces not more than 4 hours after near-white blast cleaning. Apply coats of each system so that finished surfaces are free from runs, sags, brush marks, and variations in color.

B. Application Method: Allow previous coat to dry to tack-free condition but not more than 72 hours before applying next coat. Under conditions of direct sunlight or elevated ambient temperatures of 90 degrees F or greater, limit inter-coat drying period to a maximum of 24 hours.

C. Repair of Defects: Repair detected coating holidays, thin areas, and exposed areas damaged prior to or during installation by surface treatment and application of additional coating or by manufacturer's recommendations. Allow a period of at least 72 hours to pass following final coat before placing in immersion service.

D. Dry Film Thickness: Provide total system minimum dry film thickness of 13 mils. Measure using a magnetic gage.

3.4 SURFACES TO BE COATED

A. Steel Sheet Piling: As noted on the construction drawings.

B. Overlook Steel Pipe Piling: As noted on the construction drawings.

C. Transient Dock Steel Pipe Piling: As noted on the construction drawings.

D. Steel Debris Deflector Pipe Piling: As noted on the construction drawings.

3.5 QUALITY CONTROL

A. Holiday Testing: Prior to installation, test for holidays in total coating system. Use a low-voltage holiday detector of less than 90 volts in accordance with manufacturer's instructions. After repair of holidays by surface treatment and application of additional coating or by manufacturer's recommendation, retest with a low-voltage holiday detector.

B. Dry Film Thickness: After repair of holidays, measure dry film thickness using a magnetic dry film thickness gage in accordance with ASTM D7091 and ASTM E376. If any region of coated surface has insufficient coating thickness or holidays, the coating on that region shall be repaired with an approved coal tar epoxy product. Re-measure after an additional coat is applied, if necessary to meet minimum coating thickness requirements.

C. Test Results: Submit report of coating test results. Note defective areas and corrective measures taken.

END OF SECTION 09 97 13

SECTION 26 20 00 - ELECTRICAL DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2017) Standard Specification for Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2021) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NECA NEIS 1	(2015) Standard for Good Workmanship in Electrical Construction

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.7	(2022) Requirements for Watthour Meter Sockets
ANSI C80.1	(2020) American National Standard for Electrical Rigid Steel Conduit (ERSC)
NEMA 250	(2020) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA ICS 1	(2022) Standard for Industrial Control and Systems: General Requirements
NEMA TC 2	(2020) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2021) Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA WD 1	(1999; R 2020) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2021) Wiring Devices Dimensions Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023; ERTA 4 2023) National Electrical Code
NFPA 70E	(2024) Standard for Electrical Safety in the Workplace

UNDERWRITERS LABORATORIES (UL)

UL 6	(2022) UL Standard for Safety Electrical Rigid Metal Conduit-Steel
UL 50	(2015) UL Standard for Safety Enclosures for Electrical Equipment, Non-Environmental Considerations
UL 67	(2018; Reprint Aug 2023) UL Standard for Safety Panelboards
UL 83	(2017; Reprint Mar 2020) UL Standard for Safety Thermoplastic-Insulated Wires and Cables
UL 486A-486B	(2018; Reprint Jul 2023) UL Standard for Safety Wire Connectors
UL 486C	(2018; Reprint May 2021) UL Standard for Safety Splicing Wire Connectors
UL 489	(2016; Rev 2019) UL Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 498	(2017; Reprint May 2023) UL Standard for Safety Attachment Plugs and Receptacles

UL 510	(2020; Dec 2022) UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514B	(2012; Reprint May 2020) Conduit, Tubing and Cable Fittings
UL 651	(2011; Reprint May 2022) UL Standard for Safety Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL 869A	(2006; Reprint Jun 2020) Reference Standard for Service Equipment
UL 943	(2016; Reprint Sep 2023) UL Standard for Safety Ground-Fault Circuit-Interrupters
UL 1449	(2021; Reprint Dec 2022) UL Standard for Safety Surge Protective Devices

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.

1.3 SUBMITTALS

Engineer approval is required for submittals with an "E" classification. Submit the following:

Shop Drawings

Panelboards; E

Product Data

Circuit Breakers; E

Metering; E

Surge Protective Devices; E

Test Reports

600-volt Wiring Test; E

Grounding System Test; E

Ground-fault Receptacle Test; E

Operation and Maintenance Data

Electrical Systems, Data Package 5; E

Metering, Data Package 5; E

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with NFPA 70 unless more stringent requirements are specified or indicated. NECA NEIS 1 shall be considered the minimum standard for workmanship.

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and:

a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.

b. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

c. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

1.5 MAINTENANCE

1.5.1 Electrical Systems

Submit operation and maintenance data in accordance with Section 01 78 23, OPERATION AND MAINTENANCE DATA and as specified herein. Submit operation and maintenance manuals for electrical systems that provide basic data relating to the design, operation, and maintenance of the electrical distribution system for the building. Include the following:

a. Single line diagram of the "as-built" building electrical system.

b. Schematic diagram of electrical control system (other than HVAC, covered elsewhere).

c. Manufacturers' operating and maintenance manuals on active electrical equipment.

1.6 WARRANTY

Provide equipment items supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

2.2 CONDUIT AND FITTINGS

Conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

ANSI C80.1, UL 6.

2.2.2 Rigid Nonmetallic Conduit

PVC Type EPC-40T in accordance with NEMA TC 2,UL 651[, or fiberglass conduit, in accordance with NEMA TC 14].

2.2.3 Fittings for Rigid Nonmetallic Conduit

NEMA TC 3 for PVC, and UL 514B.

2.2.4 Liquid-Tight Flexible Nonmetallic Conduit

UL 1660.

2.3 OUTLET BOXES AND COVERS

Weatherproof and self-closing cover.

2.3.1 Outlet Boxes for Luminaire Poles

Provide the following:

a. Standard type 4 1/2 inches by 2 3/4 inches wide.

2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES

UL 50; volume greater than 100 cubic inches, NEMA Type 4X Stainless Steel enclosure; sheet steel, hot-dip, zinc-coated.

2.5 WIRES AND CABLES

Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 24 months prior to date of delivery to site.

2.5.1 Conductors

Provide the following:

a. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.

b. Conductors No. 8 AWG and larger diameter: stranded.

c. Conductors No. 10 AWG and smaller diameter: solid.

d. Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3: stranded unless specifically indicated otherwise.

e. All conductors: copper.

2.5.1.1 Minimum Conductor Sizes

Provide minimum conductor size in accordance with the following:

a. Branch circuits: No. 12 AWG.

2.5.2 Color Coding

Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

2.5.2.1 Ground and Neutral Conductors

Provide color coding of ground and neutral conductors as follows:

a. Grounding conductors: Green.

b. Neutral conductors: White.

c. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals color coding: white with a different colored (not green) stripe for each.

2.5.2.2 Ungrounded Conductors

Provide color coding of ungrounded conductors in different voltage systems as follows:

a. 120/240 volt, single phase: Black and red

2.5.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: Type TW or TF, conforming to UL 83. Where equipment or devices require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.6 SPLICES AND TERMINATION COMPONENTS

UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.7 DEVICE PLATES

Provide the following:

a. UL listed, one-piece device plates for outlets to suit the devices installed.

b. For metal outlet boxes, plates on unfinished walls: zinc-coated sheet steel or cast metal having round or beveled edges.

c. For nonmetallic boxes and fittings, other suitable plates may be provided.

d. Screws: machine-type with countersunk heads in color to match finish of plate.

e. Sectional type device plates are not be permitted.

f. Plates installed in wet locations: gasketed and UL listed for "wet locations."

2.8 RECEPTACLES

Provide the following:

a. UL 498, general purpose specification grade, grounding-type. Residential grade receptacles are not acceptable.

b. Ratings and configurations: as indicated.

c. Bodies: Black as per NEMA WD 1.

d. Face and body: thermoplastic supported on a metal mounting strap.

e. Dimensional requirements: per NEMA WD 6.

f. Screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.

g. Grounding pole connected to mounting strap.

h. The receptacle: containing triple-wipe power contacts and double or triple-wipe ground contacts.

2.8.1 Split Duplex Receptacles

Provide separate terminals for each ungrounded pole. One receptacle must be controlled separately.

2.8.2 Weatherproof Receptacles

Provide receptacles, UL listed for use in "wet locations" with integral GFCI protection. Include cast metal box with gasketed, hinged, lockable and weatherproof while-in-use, [polycarbonate, UV resistant/stabilized][die-cast metal/aluminum] extra-duty rated hood.

2.8.3 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Provide device capable of detecting current leak when the current to ground is 6 milliamperes or higher, and tripping per requirements of UL 943 for Class A ground-fault circuit interrupter devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.8.4 Special Purpose Receptacles

Receptacles serving double luminaire poles are special purpose. Provide in ratings indicated. NEMA 4X configuration, rated 20 amperes, 120 volts.

2.9 PANELBOARDS

Provide panelboards in accordance with the following:

a. UL 67 and UL 50 having a short-circuit current rating as indicated.

b. Panelboards for use as service disconnecting means: additionally conform to UL 869A.

c. Panelboards: circuit breaker-equipped.

d. Designed such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL.

e. "Specific breaker placement" is required in panelboards to match the breaker placement indicated in the panelboard schedule on the design drawings. If it is not possible to match "specific breaker placement" during construction, obtain Government approval prior to device installation.

f. Use of "Subfeed Breakers" is not acceptable.

g. Main breaker: "separately" mounted["above"][or]["below"] branch breakers.

h. Where "space only" is indicated, make provisions for future installation of breakers.

i. Directories: indicate load served by each circuit in panelboard.

j. Directories: indicate source of service to panelboard (e.g., Panel PA served from Panel MDP).

k. Type directories and mount in holder behind transparent protective covering.

l. Panelboards: listed and labeled for their intended use.

m. Panelboard nameplates: provided in accordance with paragraph FIELD FABRICATED NAMEPLATES.

2.9.1 Enclosure

Provide panelboard enclosure in accordance with the following:

a. UL 50.

b. Cabinets mounted outdoors or flush-mounted: 316 SS Enclosure

c. Cabinets: painted in accordance with paragraph FIELD APPLIED PAINTING.

d. Outdoor cabinets: NEMA 4x with a removable steel plate 1/4 inch thick in the bottom for field drilling for conduit connections.

e. Front edges of cabinets: form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front.

f. All cabinets: fabricated such that no part of any surface on the finished cabinet deviates from a true plane by more than 1/8 inch.

g. Flush doors: mounted on hinges that expose only the hinge roll to view when the door is closed.

h. Each door: fitted with a combined catch and lock latch.

i. Keys: two provided with each lock, with all locks keyed alike.

j. Finished-head cap screws: provided for mounting the panelboard fronts on the cabinets.

2.9.2 Panelboard Buses

Support bus bars on bases independent of circuit breakers. Design main buses and back pans so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet.

2.9.3 Circuit Breakers

UL 489, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker will be mounted. Breaker terminals: UL listed as suitable for type of conductor provided. Where indicated on the drawings, provide circuit breakers with shunt trip devices. Series rated circuit breakers and plug-in circuit breakers are unacceptable.

2.9.3.1 Multipole Breakers

Provide common trip-type with single operating handle. Design breaker such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

2.9.3.2 Circuit Breaker With Ground-Fault Circuit Interrupter

UL 943 and NFPA 70. Provide with auto-monitoring (self-test) and lockout features, "push-to-test" button, visible indication of tripped condition, and ability to detect and trip when current imbalance is 6 milliamperes or higher per requirements of UL 943 for Class A ground-fault circuit interrupter devices.

2.9.4 Lighting Control Panelboards

Provided a lighting control panelboard having the following features:

a. Minimum sixteen schedules including a 7-day repeating schedule with sixteen daily on/off periods.

b. Minimum sixteen lighting zones grouping branch breakers that are controlled by schedules, manual inputs, or override commands.

c. Electronic clock including real-time, astronomical clock, and leap year and daylight savings time adjustments.

d. Burn-hour tracking.

2.10 ENCLOSED CIRCUIT BREAKERS

UL 489. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type must be NEMA 4X SS type 316.

2.11 GROUNDING AND BONDING EQUIPMENT

Ground rods must be copper-clad steel, with minimum diameter of 3/4 inch and minimum length 10 feet.

2.11.1 Ground Rods

Make grounding connections which are buries or otherwise normally inaccessible, excepting specifically those connection for which access for periodic testing is required, by exothermic weld or high compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating

improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make high compression connections using a hydraulic or electric compression tool to provide the correct circumferential pressure. Provide tools and dies as recommended by the manufacturer. Use an embossing die code or other standard method to provide visible indication that a connector has been adequately compressed on the ground wire.

2.12 MANUFACTURER'S NAMEPLATE

Provide on each item of equipment a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.13 FIELD FABRICATED NAMEPLATES

Provide field fabricated nameplates in accordance with the following:

a. ASTM D709.

b. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.

c. Each nameplate inscription: identify the function and, when applicable, the position.

d. Nameplates: melamine plastic, 0.125 inch thick, white with black center core.

e. Surface: matte finish. Corners: square. Accurately align lettering and engrave into the core.

f. Minimum size of nameplates: one by 2.5 inches.

g. Lettering size and style: a minimum of 0.25 inch high normal block style.

2.14 METERING

Provide metering as required by Greenville Utility Commission specifications.

2.15 METER BASE ONLY

ANSI C12.7. Provide NEMA Type 4X, box-mounted socket, ringless, having jaws compatible with requirements of a class: 200 and Form: 2S self contained watthour meter. Provide gray plastic closing cover and bypass links. Provide manufacturers standard enclosure color unless otherwise indicated.

2.16 SURGE PROTECTIVE DEVICES

Provide parallel type surge protective devices (SPD) which comply with UL 1449 where applicable. Do not install SPD inside a panelboard or switchboard enclosure. SPD must have the same short-circuit current rating as the protected equipment and must not be installed at a point of system where the available fault current is in excess of that rating. Use Type 1 or Type 2 SPD and connect on the load side of a dedicated circuit breaker. Submit performance and characteristic curves.

Provide the following modes of protection:

FOR SINGLE PHASE SYSTEMS:

Phase to phase (L-L)

Each phase to neutral (L-N)

Provide SPDs with a minimum surge current rating of 200,000 amperes for L-L mode minimum and 100,000 amperes for other modes (L-N, L-G, and N-G)

The minimum MCOV (Maximum Continuous Operating Voltage) rating for L-N and L-G modes of operation: 115 percent of nominal voltage for 240 volts and below.

2.17 FACTORY APPLIED FINISH

Provide factory-applied finish on electrical equipment in accordance with the following:

a. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.

b. Interior and exterior steel surfaces of equipment enclosures: thoroughly cleaned followed by a rust-inhibitive phosphatizing or equivalent treatment prior to painting.

c. Exterior surfaces: free from holes, seams, dents, weld marks, loose scale or other imperfections.

d. Interior surfaces: receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.

e. Exterior surfaces: primed, filled where necessary, and given not less than two coats baked enamel with semigloss finish.

f. Equipment located indoors: ANSI Light Gray[, and equipment located outdoors: ANSI[Light Gray][Dark Gray]].

g. Provide manufacturer's coatings for touch-up work and as specified in paragraph FIELD APPLIED PAINTING.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: conform to requirements of NFPA 70 and to requirements specified herein.

3.1.1 Underground Service

Underground service conductors and associated conduit: continuous from service entrance equipment to outdoor power system connection.

3.1.2 Service Entrance Identification

Service entrance disconnect devices, switches, and enclosures: labeled and identified as such.

3.1.2.1 Labels

Wherever work results in service entrance disconnect devices in more than one enclosure, as permitted by NFPA 70, label each enclosure, new and existing, as one of several enclosures containing service entrance disconnect devices. Label, at minimum: indicate number of service disconnect devices housed by enclosure and indicate total number of enclosures that contain service disconnect devices. Provide laminated plastic labels conforming to paragraph FIELD FABRICATED NAMEPLATES. Use lettering of at least 0.25 inch in height, and engrave on black-on-white matte finish. Service entrance disconnect devices in more than one enclosure: provided only as permitted by NFPA 70.

3.1.3 Wiring Methods

Provide insulated conductors installed in rigid conduit except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size: 1/2 inch in diameter for low voltage lighting and power circuits.

3.1.3.1 Pull Wire

Install pull wires in empty conduits. Pull wire: plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.4 Conduit Installation

Install conduit minimum 36" below grade.

3.1.4.1 Underground Conduit

Schedule 40 PVC conduit.

3.1.4.2 Conduit Installed in Concrete

Locate so as not to adversely affect structural strength of slabs. Do not stack conduits more than two diameters high with minimum vertical separation of 2 inches. Space conduits horizontally minimum three diameters, except at cabinet.

3.1.4.3 Stub-Ups

Provide conduits stubbed up for connection to free-standing equipment with adjustable top or coupling threaded inside. Transition to rigid steel conduit prior to conduit elbow turn ups. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.

3.1.4.4 Conduit Support

Support conduit by pipe straps, wall brackets, threaded rod conduit hangers, or ceiling trapeze. Plastic cable ties are not acceptable. Fasten by stainless steel hardware. Threaded C-clamps may be provided on rigid steel conduit only. Load applied to fasteners must not exceed one-fourth proof test load. Holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints must not cut into main reinforcing bars. Fill unused holes. Where conduit crosses expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means.

3.1.4.5 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.4.6 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.5 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways must be stainless steel type 316, hub type, and when specifically indicated. Boxes in other locations must be nonmetallic boxes provided with nonmetallic conduit system. Each box must have volume required by NFPA 70

for number of conductors enclosed in a box. Provide gaskets for boxes. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature. Fasten boxes and supports with wood screws on wood and with bolts and expansion shields on concrete. Support boxes directly from structure or by stainless steel hangers. Where stainless steel bar hangers are provided, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

3.1.5.1 Boxes

Boxes for use with raceway systems: minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet.

3.1.5.2 Pull Boxes

Construct of at least minimum size required by NFPA 70 compatible with nonmetallic raceway systems, except where stainless steel boxes are required in locations specified herein. Furnish boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

3.1.6 Mounting Heights

Mount panelboards, circuit breakers, and disconnecting switches so height of center of grip of the operating handle of the switch or circuit breaker at its highest position is maximum 78 inches above finished structure. Mount receptacles 18 inches above finished structure. In no case must entire or part of panelboards, boxes, cabinets, receptacles, and other electrical devices by mounted below the electrical datum plane as defined in FNFPA 303. Measure mounting heights of wiring devices and outlets to center of device or outlet.

3.1.7 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations.

3.1.7.1 Marking Strips

Provide marking strips for identification of power distribution, control, data, and communications cables in accordance with the following:

a. Provide white or other light-colored plastic marking strips, fastened by screws to each terminal block, for wire designations.

b. Use permanent ink for the wire numbers

c. Provide reversible marking strips to permit marking both sides, or provide two marking strips with each block.

d. Size marking strips to accommodate the two sets of wire numbers.

e. Assign a device designation in accordance with NEMA ICS 1 to each device to which a connection is made. Mark each device terminal to which a connection is made with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams.

f. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, provide additional wire and cable designations for identification of remote (external) circuits for the Government's wire designations.

g. Prints of the marking strips drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.

3.1.8 Splices

Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

3.1.9 Covers and Device Plates

Install gasketed plates with alignment tolerance of 1/16 inch.

3.1.10 Grounding and Bonding

Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, and neutral conductor of wiring systems. Make ground connection at main service equipment, and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.10.1 Ground Rods

Provide ground rods and measure the resistance to ground using the fall-of-potential method described in IEEE 81. Do not exceed 25 ohms under normally dry conditions for the maximum resistance of a driven ground. If this resistance cannot be obtained with a single rod, add additional rods, spaced on center. Spacing for additional rods must be a minimum of 10 feet. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, notify the Engineer who will decide on the number of ground rods to add.

3.1.10.2 Resistance

Maximum resistance-to-ground of grounding system: do not exceed 5 ohms under dry conditions. Where resistance obtained exceeds 5 ohms, contact Engineer for further instructions.

3.1.11 Equipment Connections

Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications and are provided under the section specifying the associated equipment.

3.1.12 Repair of Existing Work

Perform repair of existing work, demolition, and modification of existing electrical distribution systems as follows:

3.1.12.1 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of existing surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

3.1.12.2 Existing Concealed Wiring to be Removed

Disconnect existing concealed wiring to be removed from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

3.1.12.3 Removal of Existing Electrical Distribution System

Removal of existing electrical distribution system equipment includes equipment's associated wiring, including conductors, cables, exposed conduit, surface metal raceways, boxes, and fittings,[back to equipment's power source] as indicated.

3.1.13 Surge Protective Devices

Connect the surge protective devices in parallel to the power source, keeping the conductors as short and straight as practically possible. Maximum allowed lead length is 3 feet avoiding 90 degree bends. Do not locate surge protective devices inside a panelboard or switchboard enclosure.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets. Provide nameplate on all equipment in access controlled spaces and areas.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.4 FIELD APPLIED PAINTING

When field applied painting of enclosures is required to correct damage to the manufacturer's factory applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give owner 5 working days notice prior to each test[s]. Where applicable, test electrical equipment in accordance with NETA ATS.

3.5.1 Devices Subject to Manual Operation

Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

3.5.2 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of 1,000 volts DC for 600 volt rated wiring and 500 volts DC for 300 volt rated wiring per NETA ATS to provide direct reading of resistance. All existing wiring to be reused must also be tested.

3.5.3 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed. Press the TEST button and then the RESET button to verify by LED status that the device is a self-test model as specified in UL 943.

3.5.4 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

3.5.5 Watthour Meter

a. Visual and mechanical inspection

(1) Examine for broken parts, shipping damage, and tightness of connections.

(2) Verify that meter type, scales, and connections are in accordance with approved shop drawings.

b. Electrical tests

(1) Determine accuracy of meter.

(2) Calibrate watthour meters to one-half percent.

(3) Verify that correct multiplier has been placed on face of meter, where applicable.

3.5.6 Phase Rotation Test

Perform phase rotation test to ensure proper rotation of service power prior to operation of new or reinstalled equipment using a phase rotation meter. Follow the meter manual directions performing the test.

-- End of Section --

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LTS	(2013; Errata 2013) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

ASTM INTERNATIONAL (ASTM)

ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B117	(2019) Standard Practice for Operating Salt Spray (Fog) Apparatus

ILLUMINATING ENGINEERING SOCIETY (IES)

ANSI/IES LM-79	(2019) Approved Method: Electrical and Photometric Measurements of Solid State Lighting Products
ANSI/IES LM-80	(2020) Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
ANSI/IES LS-1	(2020) Lighting Science: Nomenclature and Definitions for Illuminating Engineering
ANSI/IES RP-8	(2018; Addenda 1 2020; Errata 1-2 2021) Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting
ANSI/IES TM-15	(2020) Technical Memorandum: Luminaire Classification System for Outdoor Luminaires
ANSI/IES TM-21	(2021) Technical Memorandum: Projecting Long-TermLuminous, Photon, and Radiant Flux Maintenance of LED Light Sources

IES Lighting Library	IES Lighting Library

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C136.3	(2020) Roadway and Area Lighting Equipment - Luminaire Attachments
ANSI C136.21	(2014) American National Standard for Roadway and Area Lighting Equipment - Vertical Tenons Used with Post-Top-Mounted Luminaires
NEMA 250	(2020) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA C82.77-10	(2020) Harmonic Emission Limits - Related Power Quality Requirements
NEMA C136.31	(2023) Roadway and Area Lighting Equipment - Luminaire Vibration
NEMA IEC 60529	(2004) Degrees of Protection Provided by Enclosures (IP Code)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 773	(2016; Reprint Jul 2020) UL Standard for Safety Plug-In, Locking Type Photocontrols for Use with Area Lighting
UL 773A	(2016; Reprint Jun 2020) UL Standard for Safety Nonindustrial Photoelectric Switches for Lighting Control

UL 924	(2016; Reprint Dec 2022) UL Standard for Safety Emergency Lighting and Power Equipment
UL 1310	(2018; Reprint Jun 2022) UL Standard for Safety Class 2 Power Units
UL 1598	(2021; Reprint Jun 2021) Luminaires
UL 8750	(2015; Reprint Sep 2021) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.2 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications and on the drawings must be as defined in IEEE 100 and ANSI/IES LS-1.

b. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in ANSI/IES LM-80.

c. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.

d. Total Harmonic Distortion (THD) is the Root Mean Square (RMS) of all the harmonic components divided by the total fundamental current.

1.3 SUBMITTALS

Engineer approval is required for submittals with an "E" classification. Submittals not having an "E" classification are for Contractor Quality Control approval. Submit the following:

Shop Drawings

Luminaire Drawings; E

Poles; E

Control System One-Line Diagram; E

Product Data

Luminaires; E

Luminaire Light Sources; E

Luminaire Warranty; E

Lighting Controls Warranty; E

Pole Warranty; E

Photosensors; E

Lighting Contactor; E

Poles; E

Brackets; E

Design Data

Luminaire Design Data; E

Photometric Plan; E

Test Reports

ANSI/IES LM-79 Test Report; E

ANSI/IES LM-80 Test Report; E

ANSI/IES TM-21 Test Report; E

Manufacturer's Instructions

Poles

Operation and Maintenance Data

Lighting System, Data Package 5; E

Exterior Lighting Control System, Data Package 5; E

Maintenance Staff Training Plan; E

1.4 QUALITY ASSURANCE

Data, drawings, and reports must employ the terminology, classifications and methods prescribed by the IES Lighting Library as applicable, for the lighting system specified.

1.4.1 Drawing Requirements

1.4.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), weight, accessories, and installation and construction details. Photometric data, including CRI, CCT, TM-15-11 BUG rating, LED driver type, aiming diagram, zonal lumen data, and candlepower distribution data per LM-79 must accompany shop drawings.

1.4.1.2 Pole Drawings

Include dimensions, wind load determined in accordance with AASHTO LTS, pole deflection, pole class, and other applicable information.

1.4.2 Luminaire Design Data

a. Provide distribution data according to IES classification type as defined in IES Lighting Library and ANSI/IES RP-8.

b. B.U.G. rating for the installed position as defined by ANSI/IES TM-15 and shielding as defined by ANSI/IES RP-8.

c. Provide safety certification and file number for the luminaire family. Include listing, labeling and identification in accordance with NFPA 70 (NEC). Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratories).

d. Provide long term lumen maintenance projections for each LED luminaire in accordance with ANSI/IES TM-21. Data used for projections must be obtained from testing in accordance with ANSI/IES LM-80.

e. Provide wind loading calculations for luminaires mounted on poles. Weight and effective projected area (EPA) of luminaires and mounting brackets must not exceed maximum rating of pole as installed in particular wind zone area.

1.4.3 ANSI/IES LM-79 Test Report

Submit test report on manufacturer's standard production model of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data as outlined under "14.0 Test Report" in ANSI/IES LM-79.

1.4.4 ANSI/IES LM-80 Test Report

Submit report on manufacturer's standard production LED light source (package, array, or module) of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data as outlined under "8.0 Test Report" in ANSI/IES LM-80.

1.4.5 ANSI/IES TM-21 Test Report

Submit test report on manufacturer's standard production LED light source (package, array or module) of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data, as well as required interpolation information as outlined under "7.0 Report" in ANSI/IES TM-21.

1.4.6 Test Laboratories

Test laboratories for the ANSI/IES LM-79 and ANSI/IES LM-80 test reports must be one of the following:

a. National Voluntary Laboratory Accreditation Program (NVLAP) accredited for solid-state lighting testing as part of the Energy-Efficient Lighting Products laboratory accreditation program.

b. One of the qualified labs listed on the Department of Energy - Energy Efficiency & Renewable Energy, Solid-State Lighting web site.

c. One of the EPA-Recognized Laboratories listed at for LM-80 testing.

1.4.7 Regulatory Requirements

Equipment, materials, installation, and workmanship must be in accordance with the mandatory provisions of NFPA 70 unless more stringent requirements are specified or indicated. Provide luminaires and assembled components that are approved by and bear the label of UL for the applicable location and conditions unless otherwise specified.

1.4.8 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been on sale on the commercial market through advertisements,

manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.8.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.8.2 Material and Equipment Manufacturing Date

Do not use products manufactured more than six months prior to date of delivery to site, unless specified otherwise.

1.5 DELIVERY, STORAGE, AND HANDLING OF POLES

1.5.1 Aluminum Poles

Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

1.6 WARRANTY

Support all equipment items by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.1 Luminaire Warranty

Provide and transfer to the owner the original LED luminaire manufacturers standard commercial warranty for each different luminaire manufacturer used in the project.

a. Provide a written five year minimum replacement warranty for material, luminaire finish, and workmanship. Provide written warranty document that contains all warranty processing information needed, including customer service point of contact, whether or not a return authorization number is required, return shipping information, and closest return location to the luminaire location.

(1) Finish warranty must include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

(2) Material warranty must include:

(a) All LED drivers and integral control equipment.

(b) Replacement when more than 15 percent of LED sources in any lightbar or subassembly(s) are defective, non-starting, or operating below 70 percent of specified lumen output.

b. Warranty period must begin in accordance with the manufacturer's standard warranty starting date.

c. Provide replacements that are promptly shipped, without charge, to the using owner facility point of contact and that are identical to or an improvement upon the original equipment. All replacements must include testing of new components and installation.

1.6.2 Lighting Controls Warranty

Provide and transfer to the owner the original lighting controls manufacturers standard commercial warranty for each different lighting controls manufacturer used in the project. Warranty coverage must begin from date of final system commissioning or three months from date of delivery, whichever is the earliest. Warranty service must be performed by a factory-trained engineer or technician.

a. Unless otherwise noted, provide a written one year minimum warranty on the complete system for all systems with factory commissioning. Provide warranty that covers 100 percent of the cost of any replacement parts and services required over the five years which are directly attributable to the product failure. Failures include, but are not limited to, the following:

(1) Software: Failure of input/output to execute switching or dimming commands.

(2) Damage of electronic components due to transient voltage surges.

(3) Failure of control devices, including but not limited to photosensors and motion sensors.

b. Provide a written one year minimum warranty on all input devices against defect in workmanship or materials provided by device manufacturer.

c. Provide a written one year minimum warranty on all control components attached to luminaires against defect in workmanship or materials.

1.6.3 Pole Warranty

Provide and transfer to the owner the original pole manufacturers standard commercial warranty for each different pole manufacturer used in the project. Warranty coverage must begin from date of final system commissioning or three months from date of delivery, whichever is the earliest. Provide a written five year minimum replacement warranty for material, luminaire finish, and workmanship. Warranty service must be performed by a factory-trained engineer or technician.

1.7 OPERATION AND MAINTENANCE MANUALS

1.7.1 Lighting System

Provide one electronic copy of operation and maintenance manuals for the lighting systemthat provide the basic data relating to the design, operation, and maintenance of the lighting system. Additional requirements for the Navy are provided in Section 01 78 24.00 20 FACILITY DATA WORKBOOK (FDW). Include the following:

a. Manufacturers' operating and maintenance manuals.

b. Luminaire shop drawings for modified and custom luminaires.

c. Luminaire Manufacturers' standard commercial warranty information as specified in paragraph LUMINAIRE WARRANTY.

1.7.2 Exterior Lighting Control System

Provide one electronic copy of operation and maintenance manuals for the exterior lighting control system that provide basic data relating to the design, operation, and maintenance of the exterior lighting control system. Include the following:

a. Control System One-Line Diagram

b. Product data for all devices, including installation and programming instructions.

c. Training materials, such as videos or in-depth manuals, that cover basic operation of the lighting control system and instructions on modifying the control system. Training materials must include calibration, adjustment, troubleshooting, maintenance, repair, and replacement.

PART 2 PRODUCTS

2.2 LUMINAIRES

UL 1598, NEMA C82.77-10. Provide luminaires as indicated in the luminaire schedule details on project plans, complete with light source, wattage, and lumen output indicated. All luminaires of the same type must be provided by the same manufacturer. Luminaires must be specifically designed for use with the LED driver and light source provided.

2.2.1 Luminaires

UL 8750, ANSI/IES LM-79, ANSI/IES LM-80. For all luminaires, provide:

a. Complete system with LED drivers and light sources.

b. Housing constructed of non-corrosive materials. All new aluminum housings must be anodized or powder-coated. All new steel housings must be treated to be corrosion resistant.

c. ANSI/IES TM-21, ANSI/IES LM-80. Minimum L70 lumen maintenance value of 50,000 hours unless otherwise indicated in the luminaire schedule. Luminaire drive current value must be identical to that provided by test data for luminaire in question.

d. Minimum efficacy as specified in the luminaire schedule. Theoretical models of initial lamp lumens per watt are not acceptable. If efficacy values are not listed in the luminaire schedule, provide luminaires that meet the following minimum values:

Luminaire Style	Minimum Luminaire Efficacy
Pedestrian Post-Top (pole mounted, arm mounted)	98 LPW
Bollard	75 LPW
Nature Path	63 LPW

e. Product rated for operation within an ambient temperature range of minus 22 degrees F to 104 degrees F.

f. UL listed for wet locations. Optical compartment for LED luminaires must be sealed and rated a minimum of IP65 per NEMA IEC 60529.

g. IES Lighting Library. Light distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans.

h. Housing finish that is baked-on enamel, anodized, or baked-on powder coat paint. Finish must be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

i. LED driver and light source package, array, or module are accessible for service or replacement without removal or destruction of luminaire.

j. Fully assembled and electrically tested prior to shipment from factory.

k. Finish color is as indicated in the luminaire schedule or detail on the project plans.

l. Lenses constructed of clear tempered glass or UV-resistant acrylic.

m. All factory electrical connections are made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

n. NEMA C136.31. Comply with 3G vibration testing.

o Luminaire arm bolts constructed from 304 stainless steel or zinc-plated steel.

p. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, LED drivers, surge suppressors and other electrical components using only a simple tool, such as a manual or cordless electric screwdriver.

2.3 LIGHT SOURCES

NEMA ANSLG C78.377, NEMA SSL 3. Provide type, lumen rating, and wattage as indicated in luminaire schedule on project plans.

2.3.1 LED Light Sources

Provide LED light sources that meet the following requirements:

a. NEMA ANSLG C78.377. Emit white light and have a nominal Correlated Color Temperature (CCT) of 3000 Kelvin.

b. Minimum Color Rendering Index (CRI) of 80.

c. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

d. Light source color consistency by utilizing a binning tolerance within a 4-step McAdam ellipse.

2.4 LED DRIVERS

NEMA SSL 1, UL 1310. Provide LED Drivers that are electronic, UL Class 1 or Class 2, constant-current type and meet the following requirements:

a. The combined LED driver and LED light source system is greater than or equal to the minimum luminaire efficacy values as listed in the luminaire schedule provided.

b. Operate at a voltage of 120-277 volts at 50/60 hertz, with input voltage fluctuations of plus or minus 10 percent.

c. Power Factor (PF) greater than or equal to 0.90 at full input power and across specified dimming range.

d. Maximum Total Harmonic Distortion (THD) less than or equal to 20 percent at full input power and across specified dimming range.

e. Operates for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.

f. Meets the "Elevated" (10kV/10kA) requirements per IEEE C62.41.2 -2002. Manufacturer must indicate whether failure of the electrical immunity system can possibly result in disconnect of power to luminaire. Provide surge protection that is integral to the LED driver.

g. Contains integral thermal protection that reduces the output power to protect the driver and light source from damage if the case temperature approaches or exceeds the driver's maximum operating temperature.

h. Complies with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

i. Class A sound rating for all drivers mounted under a covered structure, such as a canopy, or where otherwise appropriate.

j. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

k. UL listed for wet locations typical of exterior installations.

l. Non-dimmable.

m. Rated to operate between ambient temperatures of minus 22 degrees F and 104 degrees F.

2.5 LIGHTING CONTROLS

2.5.1 System

Provide exterior lighting control system that operates the exterior lighting system as described in the exterior lighting control strategies in the project plans. Submit Sequence of Operation for Exterior Lighting Control System describing the operation of the proposed exterior lighting control system and devices. Sequence of Operation must provide the strategies identified in the exterior lighting control strategies.

2.5.1.1 Relay Panel

Enclose panel hardware in a flush-mounted, NEMA 4x, painted, 316 stainless steel enclosure with lockable access door and ventilation openings. Internal low-voltage compartment must be separated from line-voltage compartment of enclosure with only low-voltage compartment accessible upon opening of door. Provide additional remote cabinets that communicate back to main control panel as required. Provide relay panel that meets the following criteria:

a. Input voltage of as indicated at 50/60 Hz, with internal low voltage power supply as required.

b. UL 924. 8 single-pole latching relays rated at 20 amps, as indicated volts. Provide provision for relays to close upon power failure. Provide relays designed for 10 years of use at full rated load.

c. Relay control module operates at 24 VDC and is rated to control a minimum of 8 relays.

2.5.2 Devices

2.5.2.1 Photocell

UL 773, UL 773A. Provide Photosensors that meet the following requirements:

a. Hermetically sealed, silicon diode light sensor type, rated at 400 watts, 240 volts, 50/60 Hz with single-pole, single-throw contacts.

b. Turns ON at 1 to 3 footcandles and turns OFF at 3 to 15 footcandles.

c. Designed to fail to the ON position.

d. Housing is constructed of UV stabilized polypropylene, rated to operate within a temperature range of minus 40 to 158 degrees F.

e. Time delay that prevents accidental switching from transient light sources.

f. Designed for 20-year service to match life expectancy of long-life LED fixtures and exceed 15,000 operations at full load. Provide photosensors with zero-cross technology to withstand severe in-rush current and extend relay life.

h. Swivel base type housing with 1/2 in threaded base for mounting to a junction box or conduit.

2.6 POLES

AASHTO LTS. Provide round tapered poles designed for wind loading of 123 miles per hour while supporting luminaires and all other appurtenances indicated. The effective projected areas (EPA) of luminaires and appurtenances used in calculations must be specific for the actual products provided on each pole. Provide poles that are anchor-base type designed for use with underground supply conductors. Poles must have oval-shaped hand hole having a minimum clear opening of 3 by 5 inches. Secure hand hole covers by stainless steel captive screws. Provide metal poles with an internal grounding connection accessible from the hand hole near the bottom of each pole. Install a means of wire disconnection accessible from the hand hole. Do not install square poles. Provide poles from a Manufacturer with a standard provision for protecting the finish during shipment and installation. Do not install scratched, stained, chipped, or dented poles.

2.6.1 Aluminum Poles

Provide aluminum poles with black finish unless otherwise noted in luminaire schedule on project plans. Do not paint aluminum poles. Provide poles that meet the following requirements:

a. AASHTO LTS. Manufactured of corrosion resistant aluminum alloys for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys.

b. Seamless extruded or spun seamless-type with minimum 0.188 inch wall thickness.

c. Top of shaft is fitted with a round or tapered cover.

d. ASTM B108/B108M. Pole base is mounted by anchor bolts, made of cast 356-T6 aluminum alloy. Base must be machined to receive the lower end of shaft.

e. Joint between shaft and base is welded.

f. ASTM B108/B108M. Base cover is cast 356-T6 aluminum alloy.

g. All hardware other than anchor bolts are either 2024-T4 anodized aluminum alloy or stainless steel.

h. Grounding connection is designed to prevent electrolysis when used with copper ground wire.

2.6.2 Brackets and Supports

ANSI C136.3, ANSI C136.13, and ANSI C136.21. Provide pole brackets that are not less than 1 1/4 inch aluminum secured to pole. Slip-fitter or pipe-threaded brackets may be used, but brackets must be coordinated to luminaires provided, and brackets for use with one type of luminaire must be identical. Brackets for pole-mounted street lights must correctly position luminaire no lower than mounting height indicated. Mount brackets not less than 24 feet above street. Provide special mountings or brackets as indicated and of metal which will not promote galvanic reaction with luminaire head.

2.6.3 Pole Foundations

Provide anchor bolts consisting of a steel rod with a minimum yield strength of 50,000 psi.

2.7 EQUIPMENT IDENTIFICATION

2.7.1 Manufacturer's Nameplate

Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.7.2 Labels

UL 1598. Luminaires must be clearly marked for operation of specific light sources and drivers according to proper light source type. Note the following luminaire characteristics in the format "Use Only _____":

a. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

b. Driver and dimming protocol.

Markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. LED drivers must have clear markings indicating dimming type and indicate proper terminals for the various outputs.

2.8 FACTORY APPLIED FINISH

NEMA 250. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum meets requirements of corrosion-resistance testing.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Luminaires

Install all luminaires in accordance with the luminaire manufacturer's written instructions. Install all luminaires at locations and heights as indicated on the project plans. Level all luminaires in accordance to manufacturer's written instructions. Aim all luminaires in accordance with aiming diagram.

3.1.2 LED Drivers

Provide LED drivers integral to luminaire as constructed by the manufacturer.

3.1.3 Field-Applied Painting

Provide field applied painting for luminaire type. Paint lighting equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.1.4 Aluminum Poles

Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide ornamental covers to match pole and galvanized nuts and washers for anchor bolts. \. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.

3.1.5 Lighting Controls

3.1.5.1 Photocell

Aim photocell according to manufacturer's recommendations. Mount sensor on lighting control panel.

3.1.6 Grounding

Ground noncurrent-carrying parts of equipment including[metal poles,] luminaires, mounting arms, brackets, and metallic enclosures.. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.2 FIELD QUALITY CONTROL

3.2.1 Tests

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Perform initial operational test, consisting of the entire system energized for 72 consecutive hours without any failures of any kind occurring in the system. All circuits must test clear of faults, grounds, and open circuits.

3.2.1.1 Lighting Control Verification Test

Verify lighting control system and devices operate according to approved sequence of operations. Verification tests are to be completed after commissioning.

3.3 CLOSEOUT ACTIVITIES

3.3.1 Training

Provide on-site training to the Owner's personnel in the operation and maintenance of lighting and lighting control system. Provide training that includes calibration, adjustment, troubleshooting, maintenance, repair, and replacement.

3.3.1.1 Maintenance Staff Training

Submit a Maintenance Staff Training Plan at least 30 calendar days prior to training session that describes training procedures for Owner's personnel in the operation and maintenance of lighting and lighting control system. Provide on-site training which demonstrate full system functionality, assigning schedules, calibration adjustments for light levels and sensor sensitivity, integration procedures for connecting to third-party devices, and manual override including information on appropriate use. Provide protocols for troubleshooting, maintenance, repair, and replacement, and literature on available system updates and process for implementing updates.

3.3.1.2 End-User Training

Submit a End-User Training Plan at least 30 calendar days prior to training session that describes training procedures for end-users on the lighting control system. Provide demonstration for each type of user interface. Provide users with the curfew schedule as currently commissioned, including conditional programming based on astronomic time clock functionality. Provide users with the correct contact information for maintenance personnel who will be available to address any lighting control issues.

-- End of Section --

SECTION 31 00 00 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.

1.2 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subgrade course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer.
2. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
3. Bulk Excavation: Excavations more than 10 feet (3 m) in width and pits more than 30 feet (9 m) in either length or width.
4. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, drainage fill, or topsoil materials.

I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Drainage fabric.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill, backfill, and embankment fill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill, backfill, and embankment fill.

1.4 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Section "Project Meetings."

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

D. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

E. Backfill and Fill: Satisfactory soil materials.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (38-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 100 lbf (445 N); ASTM D 4632.
2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
3. Puncture Resistance: 50 lbf (222 N); ASTM D 6241.
4. Water Flow Rate: 140 gpm per sq. ft.; ASTM D 4491.
5. Apparent Opening Size: No. 70 (0.212 mm); ASTM D 4751.

PART 3 - **EXECUTION**

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: All excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures.
2. Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: As indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
3. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
4. If soft or yielding materials are encountered, inform Engineer. Soft and yielding material may be excavated and replaced with stone or with select granular material as directed by the engineer.
5. Keep trenches dewatered during pipe laying operations. Contractor shall not lay pipe in standing water.

3.8 APPROVAL OF SUBGRADE

A. Applies to pavements for streets, roads and drives as well as plazas, hardscapes, walkways and paved areas or areas covered with masonry pavers.

B. Notify Engineer when excavations have reached required soil surface subgrade.

C. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

D. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades. Contractor shall contact the Engineer 48 hours prior to performing proof roll to coordinate time.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Place and compact initial backfill of base material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

D. Coordinate backfilling with utilities testing.

E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

F. Place and compact final backfill of satisfactory soil material to final subgrade.

G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 **COMPACTION OF BACKFILLS AND FILLS**

A. Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 98 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 85 percent.

3.16 **GRADING**

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

3.17 BASE COURSES

A. Under pavements, place base course on prepared subgrade and as follows:

1. Place base course material over subgrade.
2. Compact base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698 Standard Proctor.

3. Shape base to required crown elevations and cross-slope grades.
4. When thickness of compacted base course is 6 inches (150 mm) or less, place materials in a single layer.
5. When thickness of compacted base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698 Standard Proctor.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet (46 m) or less of trench length, but no fewer than two tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of

compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 00 00

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing.
4. Stripping topsoil.
5. Removing above- and below-grade site improvements.
6. Temporary erosion- and sedimentation-control measures.

B. Related Sections:

1. Section "Erosion and Pollution Control" for temporary erosion- and sedimentation-control measures.
2. Section “Earthwork”.
3. Section “Temporary Tree and Plant Protection”

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer.

C. Utility Locator Service: Notify NC One Call (811) for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

H. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section "Earthwork."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.

B. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.

3. Maintain fenced area free of weeds and trash.

C. Do not excavate within tree protection zones, unless otherwise indicated.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than 48 hours in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING & GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 4 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. All topsoil strip material to be hauled off-site and disposed of at an approved site.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

SECTION 31 25 00 - EROSION AND POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The general provisions of the contract, including the General and Special Conditions and Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. The extent of the work required under this section is that required to minimize water, air, and noise pollution and soil erosion and siltation.

B. Temporary erosion control measures which may be necessary include, but are not limited to, temporary berms, dikes, dams, drainage ditches, silt basins, silt ditches, perimeter swales, slope drains, structures, vegetation, mulches, mats, netting, gravel or any other methods or devices that are necessary to control or restrict erosion. Temporary erosion control measures may include work outside the right-of-way or construction limits where such work is necessary as a result of construction such as borrow pit operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in waste areas furnished by the Contractor.

C. Related Work Specified Elsewhere: Earthwork
Clean-up and Seeding

1.3 QUALITY ASSURANCE

A. Codes and Standards: North Carolina Sedimentation Pollution Control Act of 1973 and the Rules and Regulations promulgated pursuant to the provisions of said act.

B. “Standard Specifications for Roads and Structures”, North Carolina Department of Transportation (DOT).

C. In the event of conflict between the regulations listed above and the requirements of these specifications, the more restrictive requirement shall apply.

1.4 SANCTIONS

A. Failure of The Contractor to fulfill any of the requirements of this section may result in the Owner ordering the stopping of construction operations in accordance with SUBARTICLE 13.8 of the General Conditions until such failure has been corrected. Such suspension of operations will not justify an extension of contract time nor additional compensation.

B. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltations, and pollution will result in the Engineer notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Owner may suspend the work as provided above, or may proceed to have such measures performed with other forces and equipment, or both. The cost of such work performed by other forces will be deducted from monies due the Contractor on his contract.

PART 2 - PRODUCTS

2.1 SILT FENCES

A. Posts: Steel posts shall be 5’ in height and be of self-fastener angle steel type.

B. Posts shall be spaced at 8’ maximum when silt fence is backed with wire mesh, and 6’ when no wire mesh is used or as required by the Engineer.

C. Woven Wire: Woven wire fencing shall conform to ASTM A116 for Class 3 galvanizing. Fabric shall be a minimum of 32” in width and shall have a minimum of 6 line wires with 12” stay spacing. The top and bottom wires shall be 10 gauge while the intermediate wires shall be 12-1/2 gauge. Wire fabric shall be fastened to wood posts with not less than 9 wire staples 1-1/2” long.

D. Fabric: Provide woven synthetic fiber designed specifically for silt fence conforming to NCDOT specifications.

2.2 DRAINAGE STONE

A. Class I material NCDOT No. 57.

2.3 TEMPORARY SEEDING:

A. Temporary seeding, when required, shall be performed in accordance with the recommendations contained in “Guide for Sediment Control on Construction Sites in North Carolina”, published by the Soil Conservation Service and Section Clean-up and Seeding of these specifications.

PART 3 - EXECUTION

3.1 GENERAL

The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, and water, air, and noise pollution caused by his operations. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep himself fully informed of all such regulations which in any way affect the conduct of the work, and shall at all times observe and comply with all such regulations. In the event of conflict between such regulations and the requirements of the specifications, the more restrictive requirements shall apply.

3.2 EROSION AND SILTATION CONTROL

A. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property.

B. Prior to suspension of operations on the project or any portion thereof, the Contractor shall take all necessary measures to protect the construction area, including but not limited to borrow sources, soil type base course sources, and waste areas, from erosion during the period of suspension.

C. Provide diversion ditches and berms as necessary to prevent concentrated flow of water across disturbed areas.

D. Stockpile excavated material on the opposite side of the utility trenches from the watercourses to the extent that is possible.

E. In the event that stockpiles are placed on the watercourse side of the trench, provide silt fence or silt berms with stone filter outlets along the entire length of the stockpile that is on the watercourse side of the trench. Upon the completion of backfilling, the measures shall be removed and the site graded to its natural grade or as shown on plans.

F. Maintain natural buffer zones along all watercourses sufficient to retain all visible siltation within the first 25 percent of the buffer width.

G. Provide a settling basin with a gravel filter outlet for all water pumped from trenches or dewatering equipment. Pumping of that water directly into any stream, pond, or watercourse is prohibited.

H. Temp, fertilize, seed and mulch the disturbed areas as soon as practicable after line is installed and, in all cases, no later than 21 days after completion of the line segment or work at a particular site.

I. When construction operations are suspended for more than 21 days, provide temporary seeding and mulching of all disturbed areas including those areas in which further construction is necessary.

J. Erosion control measures installed by the Contractor shall be acceptably maintained by the Contractor.

K. Silt fences shall be provided where shown on the drawings and/or as necessary to prevent erosion.

L. Catch basins shall be protected from silt by placing straw bales or silt fence around the opening until vegetative cover is established.

3.3 WATER AND AIR POLLUTION

A. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent pollution of rivers, streams, and water impoundments. Pollutions such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste shall not be discharged into or alongside of rivers, streams, or impoundments, or into natural or manmade channels leading thereto.

3.4 DUST CONTROL

A. The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project, including, but not specifically limited to, unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources, and production sites. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property.

3.5 NOISE CONTROL

A. The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent excessive and unnecessary noise. The Contractor shall choose his methods so as to minimize the disturbance of area residents.

END OF SECTION 31 25 00

SECTION 31 41 16 – METAL SHEET PILING

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of the preparation, installation, and handling of the steel sheet pile bulkhead as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to complete the steel sheet pile bulkhead as indicated on the project drawings and specified herein.

1.2 RELATED SECTIONS

A. Section 05 50 13 Miscellaneous Metal Fabrications

B. Section 09 97 13 Coating of Steel Waterfront Structures

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Welding Society (AWS)

AWS D1.1/D1.1M Structural Welding Code – Steel

C. American Society for Testing and Materials (ASTM)

ASTM A6/A6M General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

ASTM A572/A572M High-Strength Low-Alloy Columbium-Vanadium Structural Steel

1.4 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Shop Drawings

1. Metal Sheet Piling: Detail drawings for sheet piling, including fabricated sections, showing complete piling dimensions and details, driving sequence and location of installed piling. Include in the drawings details of top protection, special reinforcing tips,

tip protection, lagging, splices, fabricated additions to plain piles, cut-off method, corrosion protection, and dimensions of templates and other temporary guide structures for installing piling. Provide details of the method for handling piling to prevent permanent deflection, distortion or damage to piling interlocks. Show connections to structural systems, weld details, and anchoring details as specified in the contract drawings.

C. Product Data

1. Driving: Submit records of the completed sheet piling driving operations, including a system of identification which shows the disposition of approved piling in the work, driving equipment performance data, piling penetration rate data, piling dimensions and top and bottom elevations of installed piling. Drive pilings with the proper size hammer and by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths.

2. Pile Driving Equipment: Submit complete descriptions of sheet piling driving equipment including hammers, extractors, protection caps and other installation appurtenances, prior to commencement of work. Descriptive information includes manufacturer's name, model numbers, capacity, rated energy, hammer details, cushion material, helmet, and templates. Provide pile driving equipment conforming to the following requirements. Submit descriptions of pile driving equipment, including hammers, power packs, driving helmets, hammer cushions, pile cushions, leads, extractors, and preboring equipment at least 30 days prior to commencement of work.

3. Pulling and Redriving: The proposed method of pulling sheet piling, prior to pulling any piling.

D. Test Reports

1. Materials Tests: Certified materials tests reports showing that sheet piling and appurtenant metal materials meet the specified requirements, for each shipment and identified with specific lots prior to installing materials. Material test reports shall meet the requirements of ASTM A6.

E. Closeout Submittals

1. Pile Driving Record: Record for each sheet pile driven, as specified.

1.5 SYSTEM DESCRIPTION

A. Submit descriptions of pile driving equipment to be employed in the work. Descriptive information includes manufacturer's name, model numbers, capacity, rated energy, hammer details, cushion material, helmet, and templates.

1.6 QUALITY ASSURANCE

A. Material Certificates: For each shipment, submit certificates identified with specific lots prior to installing piling. Include in the identification data piling type, dimensions, chemical composition, mechanical properties, section properties, heat number, and mill identification mark.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Materials delivered to the site shall be new and undamaged and shall be accompanied by certified test reports. Provide the manufacturer's logo and mill identification mark on the sheet piling as required by the referenced specifications. Store and handle sheet piling in the manner recommended by the manufacturer to prevent permanent deflection, distortion or damage to the interlocks; as a minimum, support on level blocks or racks spaced not more than 10 feet apart and not more than 2 feet from the ends. Storage of sheet piling shall also facilitate required inspection activities and prevent corrosion and damage to coatings prior to installation.

PART 2 - PRODUCTS

2.1 STEEL SHEET PILING

A. Steel sheet piling shall be hot-rolled steel sections conforming to ASTM A572/A572M, Grade 60.

1. Coat sheet piles in accordance with Section 09 97 13, “Coating of Steel Waterfront Structures.”

B. Interlocks: The interlocks of sheet piling shall be free-sliding, provide a swing angle suitable for the intended installation but not less than 5 degrees when interlocked, and maintain continuous interlocking when installed.

C. General Requirements: Sheet piling, including z-shaped sections, interlocks, and connectors, shall be full-length sections of the dimensions shown. Provide sheet piling with standard lifting holes. Fabrication for sheet piling shall be as specified herein and as specified in Section 05 50 13, “Miscellaneous Metal Fabrications,” as applicable.

2.2 APPURTENANT METAL MATERIALS

A. Provide metal plates, shapes, and other appurtenant fabrication and installation materials conforming to manufacturer's standards and to the requirements specified in the respective sheet piling standards and in Section 05 50 13, “Miscellaneous Metal Fabrications.”

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Requirements for material tests, workmanship and other measures for quality assurance shall be as specified and in Section 05 50 13, “Miscellaneous Metal Fabrications.”

2.4 PILE DRIVING EQUIPMENT

A. Driving Hammers

1. Hammers must be vibratory type. The driving energy of the hammers must be as recommended by the manufacturer for the piling weights and subsurface materials to be encountered. Repair damage to piling caused by use of a pile hammer with excess delivered force or energy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Placing and Driving

1. Any excavation and removal of debris along the mudline required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings. Contractor shall probe along the sheet pile alignment to a minimum of 10 feet below the existing mudline to verify obstructions are not present within the footprint of the sheet pile being installed. Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.

    a. Sheet piling shall be carefully located as indicated or as otherwise directed by the Engineer. Pilings shall be placed plumb with out-of-plumbness not exceeding 1/8 inch per foot of length and true to line. Place the pile so the face will not be more than 6 inches from vertical alignment at any point. Top of pile at elevation of cut-off shall be within 1/2 inch horizontally and 2 inches vertically of the location indicated. Extents of piles shall be within 6 inches of locations shown on the drawings. Manipulation of piles to force them into position will not be permitted. Check all piles for heave. Redrive all heaved piles to the required tip elevation.

    b. Provide temporary wales, templates, or guide structures to ensure that the pilings are placed and driven to the correct alignment. Use a system of structural framing sufficiently rigid to resist lateral and driving forces and to adequately support the sheet piling until design tip elevation is achieved. Use two templates, at least, when placing each piling not less than 20 feet apart. Templates shall not move when supporting sheet piling. Fit templates with wood blocking, UHMW-PE, or other suitable material to bear against the web of each alternate sheet pile and hold the sheet pile at the design location alignment. Provide outer template straps or other restraints as necessary to prevent the sheets from warping or wandering from the

alignment. Mark template for the location of the leading edge of each alternate sheet pile. If in view, also mark the second level to assure that the piles are vertical and in position. If two guide marks cannot be seen, other means shall be used to keep the sheet pile vertical along its leading edge.

2. Maintain driving hammers in proper alignment during driving operations by use of leads or guides attached to the hammer.

3. Employ a protecting cap in driving when using impact hammers to prevent damage to the tops of pilings. Remove and replace pilings damaged during driving or driven out of interlock at the Contractor's expense.

4. Drive pilings without the aid of a water jet.

5. Take adequate precautions to ensure that pilings are driven plumb. Where possible, drive Z-pile with the ball end leading. If an open socket is leading, a bolt or similar object placed in the bottom of the interlock will minimize packing material into it and ease driving for the next sheet. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb in the plane of the wall the piling being driven shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures shall be taken to insure the plumbness of succeeding pilings. The maximum permissible taper for any tapered piling shall be 1/8 inch per foot of length.

6. Pilings in each run or continuous length of piling wall shall be driven alternately in increments of depth to the required depth or elevation. No piling shall be driven to a lower elevation than those behind it in the same run except when the pilings behind it cannot be driven deeper. Incrementally sequence driving of individual piles such that the tip of any sheet pile shall not be more than 4 feet below that of any adjacent sheet pile. When the penetration resistance exceeds five blows per inch, the tip of any sheet pile shall not be more than 2 feet below any adjacent sheet pile. If the piling next to the one being driven tends to follow below final elevation it may be pinned to the next adjacent piling.

7. If obstructions restrict driving a piling to the specified penetration, the obstructions shall be removed or penetrated with a chisel beam. If the Contractor demonstrates that removal or penetration is impractical, make changes in the design alignment of the piling structure as directed to ensure the adequacy and stability of the structure. Pilings shall be driven to depths shown and shall extend up to the elevation indicated for the top of pilings. A tolerance of 2 inches above the indicated top elevation will be permitted. Pilings shall not be driven within 100 feet of concrete less than 7 days old.

8. Pre-augering or spudding of piles will not be permitted.

B. Cutting-Off and Splicing: Pilings driven to refusal or to the point where additional penetration cannot be attained and are extending above the required top elevation in

excess of the specified tolerance shall be cut off to the required elevation. Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving shall be extended as required to reach the top elevation by splicing when directed at no additional cost to the Owner. If directed, pilings shall be spliced as required to drive them to depths greater than shown and extend them up to the required top elevation.

1. Pilings adjoining spliced pilings shall be full length unless otherwise approved. If splices are allowed in adjoining pilings, the splices shall be spaced at least 4 feet apart in elevation. Splicing of pilings shall be as indicated. Ends of pilings to be spliced shall be squared before splicing to eliminate dips or camber. Pilings shall be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips, or camber at the abutting interlocks. Spliced pilings shall be free sliding and able to obtain the maximum swing with contiguous pilings. Welding and inspection of splices shall conform to the requirements of Section 05 50 13, “Miscellaneous Metal Fabrications”. Shop and field welding, qualification of welding procedures, welders, and welding operators shall be in accordance with AWS D1.1/D1.1M.

2. The tops of pilings excessively battered during driving shall be trimmed when directed, at no cost to the Owner. Piling cut-offs shall become the property of the Contractor and shall be removed from the site.

3. Cut holes in pilings for bolts, rods, drains, reinforcing, and utilities in a neat and workmanlike manner, as shown or as directed. Use a straight edge in cuts made by burning to avoid abrupt nicks. Bolt holes in steel piling shall be drilled or may be burned and reamed by approved methods which will not damage the surrounding metal. Holes other than bolt holes shall be reasonably smooth and the proper size for rods and other items to be inserted. Do not use explosives for cutting.

C. Inspection of Driven Piling: Perform continuous inspection during pile driving. Inspect all piles for compliance with tolerance requirements. Bring any unusual problems which may occur to the attention of the Engineer. Inspect the interlocked joints of driven pilings extending above ground. Pilings found to be out of interlock shall be removed and replaced at the Contractor's expense.

D. Pulling and Redriving: Submit the proposed method of pulling sheet piling, prior to pulling any piling. Pull, as directed, selected pilings after driving to determine the condition of the underground portions of pilings. Any piling so pulled and found to be damaged, to the extent that its usefulness in the structure is impaired, shall be removed and replaced at the Contractor's expense. Pilings pulled and found to be in satisfactory condition shall be redriven when directed.

3.2 INSTALLATION RECORDS

A. The Contractor shall maintain a pile driving record for each sheet pile component driven as specified herein. Indicate on the installation record: installation dates and times, type and

size of hammer, rate of operation, total driving time, dimensions of driving helmet and cap used, blows required per foot for each foot of penetration, final driving resistance in blows for final 6 inches, pile locations, tip elevations, ground elevations, cut-off elevations, and any reheading or cutting of piles. Record any unusual pile driving problems during driving. Submit complete records in a timely manner to the Engineer.

B. Concrete for the wall cap shall not be placed until the Engineer has reviewed and accepted the pile driving records.

3.3 AS-BUILT PILE SURVEY

A. After installation of all metal sheet piling for the bulkhead wall and before placement of concrete for the wall cap, perform a survey of the piling cutoff elevations and horizontal plan location for the entire plan length of the wall. Report a cutoff elevation for each Z-shaped sheet pile. Piling plan location shall be measured at the interlocks between each Z-shaped sheet pile which are on the waterside face of the wall.

B. The survey points for plan location of the wall shall be connected with straight lines and plotted against the edges of the bulkhead wall concrete cap and fascia as they are shown in the construction drawings.

C. Concrete for the wall cap shall not be placed until the Engineer has reviewed and accepted the surveyed wall piling as being within the installation tolerances of this specification.

END OF SECTION 31 41 16

SECTION 31 62 16 – STEEL PIPE PILES

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of fabrication and installation of steel pipe piles as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary to provide piles as indicated on the project drawings and specified herein.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Welding Society (AWS)

AWS D1.1	(2020; Errata 1 2021) Structural Welding Code - Steel

C. American Society for Testing and Materials (ASTM)

ASTM A6	(2021) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A252	(2010) Welded and Seamless Steel Pipe Piles

D. American Petroleum Institute (API)

API RP 2A	(2014) Planning, Designing, and Construction Fixed Offshore Platforms

1.3 SUBMITTALS

A. The Contractor shall submit the following in accordance with Contract Documents. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Preconstruction Submittals

1. Installation Procedures: Submit information on the type of equipment proposed to be used, proposed methods of operation, pile driving plan (including proposed sequence of driving), and details of all pile driving equipment and accessories. Provide methods of handling and cutting off piles.

C. Shop Drawings

1. Steel Pipe Piles: Show all locations, markings, layouts, materials, sizes, and shapes and indicate all methods of connection and bracing including shop welding procedures.

2. Pile Splices: Submit detail drawings of pile splices, if any, prior to fabrication.

3. Pile Placement: Submit pile placement plan at least 15 days prior to delivery of piles to the job site.

D. Product Data

1. Pile Driving Equipment: Submit descriptions of pile driving equipment at least 15 days prior to commencement of work.

2. Pile Driving Records: Submit the proposed form for compiling pile driving records 15 days prior to commencement of work.

3. Pulling and Redriving: The proposed method of pulling pipe piles, prior to pulling any piling. Piling shall not be pulled under any circumstances without prior written authorization from the Owner or Owner's Representative

4. Material Orders, As Applicable: Furnish copies of purchase orders, mill orders, shop orders and work orders for all material orders prior to the use of the materials in the work. Where mill tests are required, purchase orders shall include the test site address and the name of the testing agency.

E. Certificates

1. Steel Pipe Piles

a. Material Tests: For each shipment, submit certified test reports or certificates of conformance, furnished by the manufacturer's and/or fabricator's testing laboratory or an independent testing agency, attesting that each steel pipe pile and appurtenant metal materials furnished meet the material requirements specified herein. Certified tests shall have been performed on the specified materials within two (2) years of submittal at a United States certified testing laboratory. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested materials are of the same type, quality, manufacture, and make as that proposed to be supplied. Submit certificates identified with specific lots prior to installing piling. Include in the identification data piling type, dimensions, chemical composition, mechanical properties, section properties, heat number, and mill identification mark. Material test reports shall meet the requirements of ASTM A6.

F. Closeout Submittals

1. Pile Diving Records: Submit complete and accurate job pile driving records within 15 calendar days after completion of driving.

1.4 DELIVERY, STORAGE, AND HANDLING

A. All delivery, storage, and handling of materials shall conform to the requirements specified herein. Develop and submit plans for the delivery, storage, and handling of piles.

B. Delivery and Storage: Stack piles during delivery and storage so that each pile is maintained in a straight position and is supported every 10 feet or less along its length (ends inclusive) to prevent exceeding the maximum camber or sweep.

C. Handling: Lift piles using a cradle or multiple point pick-up to ensure that the maximum permissible camber or sweep is not exceeded due to insufficient support, except that a one-point pick-up may be used for lifting piles that are not extremely long into the driving leads. Point pick-up devices must be of the type that clamp to both pile flanges at each pick-up point. Holes may be burned in the piles above the cutoff length for lifting piles into the leads. Do not drag piles across the ground.

D. Inspect piles for excessive camber and sweep and for damage before transporting them from the storage area to the driving area and immediately prior to placement in the driving leads. Camber and sweep must be measured with the pile laying on a flat surface and is the distance between the mid-length of the pile and the flat surface. The maximum permissible camber or sweep is 2 inches over the length of the pile. Piles having excessive camber or sweep will be rejected.

PART 2 - PRODUCTS

2.1 PILES

A. Piling Materials: Steel pipe piles shall be of the size and type shown on the project drawings. Pipe piles shall be of the shape and section shown. Length of piles shall be determined as specified in Paragraph “Installation”. Acceptable material specifications and mandatory additional requirements are as follows:

1. Materials for steel pipe piles shall conform to the requirements of ASTM A252, Grade 3 Modified (50 ksi).

2. Spiral and/or straight seam and splice welds shall be double fused beveled submerged arc welds in accordance with AWS. Spiral-lap construction is not permitted.

3. All welds shall conform to AWS D1.1 and the requirements of this Section, except the alignment tolerance shall be 1/16 inch.

B. Pile Dimensional Tolerances

1. Deviation from a straight line shall not exceed length/1000 along the entire length of pile.

C. Pile Splices: When approved, pile splices shall conform to ASTM A252, Grade 3 (50 ksi). Provide splices of the full penetration butt weld type. Construct splices to maintain the true alignment and position of the pile sections. Splices shall develop the full strength of the pile in both bearing and bending. Field splicing of pipe piles is not permitted without prior review and acceptance from the Owner's Representative.

2.2 COATING OF PILES

A. Steel pipe piles shall be coated in accordance with Specification Section 099713, "COATING OF STEEL WATERFRONT STRUCTURES".

PART 3 - EXECUTION

3.1 PRELIMINARY WORK

A. Allowable Driving Stresses

1. Steel Piles (fy is yield strength of steel)

a. Compression 0.9 fy

b. Tension 0.9 fy

B. All pile driving equipment furnished by the Contractor shall be subject to the approval of the Contractor's Geotechnical Consultant.

3.2 FABRICATION

A. General: The dimensional tolerances of the pipe piles shall be in accordance with API RP 2B.

B. Welding Procedures and Qualifications: All welding shall be in accordance with AWS D1.1, as modified by this specification. The preparation and welding of structural tubular and tubular intersections shall conform to AWS D1.1.

C. All welds shall be 100% penetration unless otherwise specified herein, detailed on the drawings, or exempted by the Owner's Representative in writing. Full penetration welds shall conform to details permitted in AWS D1.1, unless qualified by testing and applied by specially qualified welders. All circumferential full penetration welds shall be 100% Ultrasonic Tested (UT).

D. Process and Consumables: Welding of mild steel in thickness greater than 1 inch and all other steels shall use low hydrogen consumables. If qualified by testing the root pass and hot pass of single sided tubular welds made without backing may be made with cellulosic SMAW electrodes (e.g., E7010); however, all other passes shall conform to the low

hydrogen requirement unless otherwise approved in writing by the Owner's Representative. GMAW may be used for welding the root pass of groove welds providing subsequent passes are made with SAW.

E. Production Welding

1. Splices: When approved, pipe sections of the same diameter and wall thickness may be spliced to economically use materials. No two splices shall be located closer together than 10 feet. Longitudinal seams in adjacent sections of pipe shall be rotated a minimum of 15 degrees. Welded splices shall be full penetration to develop 100% joint efficiency. The use of permanent backing rings is not permitted without specific approval by the Owner's Representative.

2. Application of Welding

   a. Joint details for welding pipe shall be as shown in AWS D1.1 wherever practical. When a transition from one basic groove detail to another or to fillet weld is required in otherwise continuous weld connection, Contractor shall define the boundaries and changing contour to be developed in the transition zone.

   b. Run-on and run-off tabs shall be provided at the ends of groove welds in plates and structural shapes.

   c. Root openings in the welded joint wider than permitted by AWS D1.1, but not by an amount greater than the thickness of the thinner member may be built up by welding to the specified groove dimensions before the parts are joined. Root openings less than permitted by AWS D1.1 or qualified in the welding procedure qualification shall be repaired to maintain the specified groove dimensions before the parts are joined.

   d. All faying surfaces not requiring structural welds shall be sealed by a continuous 1/8 inch (3mm) fillet weld in accordance with API RP-2A.

   e. Stray current corrosion of the structure shall be avoided during installation at the site. Welding machines shall be placed on the structure being welded.

   f. Where this is not practical, the insulated welding power source output 'ground' lead shall be connected directly to the work at a location close to the weld being made and shall not be permitted to touch the water. The minimum total cross sectional area of the return ground cable(s) shall be one million circular mils per 1000 amperes per 100 feet (645 circular mm per 1000 amperes per 30.5 m) of span. Grounding efficiency shall be periodically monitored by simultaneously measuring the potential of the structure being welded and that holding the welding machines. A change in potential reading from either indicates insufficient grounding.

   g. Welders and welding operators shall mark their work with their identifying number.

h. Contractor shall make good all coatings that may have been removed or damaged during fabrication and erection.

3.3 PILE DRIVING EQUIPMENT

A. Select the proposed pile driving equipment, including hammers and other required items, and submit complete descriptions of the proposed equipment in accordance with Paragraph "Submittals". Changes in the selected pile driving equipment will not be allowed after the equipment has been approved except as directed. No additional contract time will be allowed for Contractor proposed changes in the equipment.

B. Pile Driving Hammers: Provide impact type pile driving hammers.

1. Impact Hammers: Provide steam, air, or diesel-powered impact pile hammers of the single-acting, double-acting, or differential-acting type. The size or capacity of hammers must be as recommended by the hammer manufacturer for the total pile weight and the character of the soil formation to be penetrated. Hammers must be capable of, and so demonstrated during the development of refusal criteria, hard driving in excess of 20 blows per inch. Provide boiler, compressor, or engine capacity sufficient to operate hammers continuously at the full rated speed. Hammers must have a gage to monitor hammer bounce chamber pressure for diesel hammers or pressure at the hammer for air and steam hammers. This gage must be operational during the driving of piles and be mounted in an accessible location for monitoring. Obtain driving energy by use of a heavy ram and a short stroke with low impact velocity, rather than a light ram and a long stroke with high impact velocity. Position a pile cap or drive cap between the pile and hammer. Place hammer cushion or cap block between ram and the pile cap or drive cap. Hammer cushion or cap block must have consistent elastic properties, minimize energy absorption, and transmit hammer energy uniformly and consistently during the entire driving period. In accordance with Paragraph "Submittals", submit the following information for each impact hammer proposed:

a. Make and model

b. Ram weight (pounds)

c. Anvil weight (pounds)

d. Rated stroke (inches)

e. Rated energy range (foot-pounds)

f. Rated speed (blows per minute)

g. Steam or air pressure, hammer, and compressor (psi)

h. Pile driving cap, make, and weight (pounds)

i. Cushion block dimensions and material type

j. Power pack description

C. Pile Driving Leads: Support and guide hammers with fixed extended leads, swinging pile loads, or fixed underhung leads. Provide two intermediate supports for the pile in the leads to reduce the unbraced length of the pile during driving and pulling.

3.4 INSTALLATION

A. Inspect piles when delivered and when in the leads immediately before driving. Handle piles so as to protect pile coatings. Repair damage or defects in pile coatings as specified. Cut piles at cutoff grade by an approved method. Fill the interior pile annulus for the transient dock foundation piles with sand and/or concrete to the elevations indicated on the project drawings.

B. Pile Driving Records: Develop a form for compiling pile driving records, which must be approved, for recording pile driving data. Compile and submit accurate records of the pile driving operations on the approved form in accordance with Paragraph "Submittals". Include in driving records for each pile: date driven, pile identification number, cross section shape and pile dimensions, location, deviations from design location, original length, ground elevation, top elevation, tip elevation, description of hammer used, number of blows required for each foot of penetration throughout the entire length of the pile and for each inch of penetration in the last foot of penetration, total driving time in minutes and seconds, and any other pertinent information as required or requested such as unusual driving conditions, interruptions or delays during driving, damage to pile resulting from driving, heave in adjacent piles, redriving, weaving, obstructions, jetting, predrilling, and depth and description of voids formed adjacent to the pile. Additional data required to be recorded for impact hammers includes the rate of hammer operation, make, size, and the length of the bounce hose. Additional data required to be recorded for vibratory hammers includes hammer power pack description, make, size, horsepower applied to pile, and hammer operating frequency.

C. Pile Placement and Tolerances in Driving: Develop and submit a pile placement plan which shows the installation sequence and the methods proposed for controlling the location and alignment of piles. Accurately place piles in the correct location and alignments, both laterally and longitudinally, and to the vertical lines indicated. Establish a permanent base line to provide for inspection of pile placement during pile driving operations prior to driving job piles and maintain during the installation of the job piles. A final lateral deviation from the correct location at the cutoff elevation of not more than 3 inches will be permitted for vertical piles. Manipulation of piles will not be permitted. A variation of not more than 1/4 inch per foot of pile length from the vertical for vertical piles will be permitted. A vertical deviation of not more than 1 inch from the correct cutoff elevations shown is permitted. Inspect piles for heave. Redrive heaved piles to the required tip elevation. Maintain the correct relative position of all piles by the use of templates or by other approved means. Piles damaged or not located properly or exceeding the maximum limits for rotation, lateral

and vertical deviation, or variation in alignment must be pulled and new piles redriven, or provide additional piles, at a location directed.

D. Pile Penetration Criteria: The controlling tip elevation for production piles will be based on those shown on the project drawings.

E. Pile Driving: Do not drive piles within 100 feet of concrete less than 7 days old. Drive job piles with hammers of the same model and manufacturer, same energy and efficiency, and using the same driving system. Operate hammers at all times at the speed and under the conditions recommended by the manufacturer. Prior to driving and with the pile head seated in the hammer, check each pile to ensure that it has been aligned correctly and that the orientation of the web about the centerline is as shown. Once pile driving has begun, keep conditions such as alignment constant. Drive each pile continuously and without interruption until the required tip elevation has been attained. Deviation from this procedure will be permitted only when driving is stopped by causes that reasonably could not have been anticipated. A pile that cannot be driven to the required depth because of an obstruction, as indicated by a sudden unexplained change in blow count and drifting, must be pulled and redriven or cut off and abandoned, whichever is directed. After piles are driven, cutoff square as required at the indicated cutoff elevation. Backfill any voids around piles or abandoned holes for pulled piles with sand and compact to the same density as the surrounding soil.

1. Splicing Piles: A pile that has not reached the required refusal blow count when the top has been driven to the cutoff elevation must be spliced as shown and driven to a sufficient depth to develop the required refusal blow count. When approved, provide splices of the full penetration butt weld type or proprietary prefabricated splicer sleeves. Use only one splice per length of pile. Avoid field splices for lengths under 80 feet. Construct splices to maintain the true alignment and position of the pile sections. Splices must develop the full strength of the pile in both bearing and bending.

2. Jetting: Jetting of piles is not permitted.

3. Predrilling: Predrilling of piles is not permitted.

4. Heaved Piles: When driving piles in clusters or under conditions of relatively close spacing, perform observations to detect heave of adjacent piles. Backdrive heaved piles to original tip elevation.

5. Pulled Piles: Pull and replace piles damaged or impaired for use during driving with new piles, or cut off and abandon and drive new piles as directed. Redrive piles pulled as directed and found to be in suitable condition at another location as directed.

6. Long Piles: Handle and drive piles of a high slenderness ratio carefully to prevent overstress. Provide pile driving rig with rigid supports so that leads remain accurately aligned. Where a high degree of accuracy is required, erect templates or guide frames at or close to the ground or water surface.

7. Welding: AWS D1.1

3.5 FIELD QUALITY CONTROL

A. Pile Records: Keep a complete and accurate record of each pile driven. Indicate the pile location, deviations from pile location, cross section shape and dimensions, original length, ground elevation, tip elevation, cut-off elevations, batter alignment, number of blows required for each foot of penetration and number of blows for the last 6 inches penetration or fraction thereof for the "calculated" driving resistance. Include in the record the beginning and ending times of each operation during driving of pile, type and size of hammer used, rate of operation, stroke or equivalent stroke for diesel hammer, type of driving helmet, and type and dimension of hammer cushion (capblock) and pile cushion used. Record retap data and unusual occurrences during pile driving such as redriving, heaving, weaving, obstructions, and any driving interruptions.

END OF SECTION 31 62 16

SECTION 31 62 19 – TIMBER PILES

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of fabrication and installation of timber piling for the as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall all material and equipment and the performing of all labor necessary to complete fabrication and installation of timberwork associated with the timber piling, connections, and fasteners for the pier as shown on the Contract Drawings and as herein specified or directed by the Owner's Representative.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Wood Protection Association (AWPA)

AWPA A4	Standard Methods for Sampling Wood Preservatives
AWPA A9	Standard Method for Analysis of Treated Wood and Treating Solutions by X-Ray Spectroscopy
AWPA M2	Standard for the Inspection of Preservative Treated Products for Industrial Use
AWPA M4	Standard for the Care of Preservative-Treated Wood Products
AWPA M6	Brands Used on Forest Products
AWPA U1	Use Category System for Treated Wood

C. American Society for Testing and Materials (ASTM)

ASTM D25	Round Timber Piles

D. U.S. National Archives and Records Administration (NARA)

40 CFR 171	Certification of Pesticide Applicators

E. Western Wood Preserves Institute (WWPI)

WWPI Mgt Practices	Best Management Practices for the Use of Treated Wood in Aquatic Environments

1.3 SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00, "Submittals" of these Specifications. Note that approval of submittals by the Engineer shall not be construed as relieving the Contractor from responsibility for compliance with the Specifications nor from responsibility of errors of any sort in the submittals.

B. Product Data

1. Piles

2. Pile Driving Equipment: Submit complete descriptions of pile driving equipment, including hammers, leads, driving helmets, cushion blocks, driving blocks, collars, extractors, and other appurtenances for approval prior to commencement of work.

C. Test Reports

D. Preservative Treated Piles: A certified test analysis from an approved testing organization attesting that the piles to be used in the work have been given the preservative treatment required by these specifications shall be submitted prior to commencement of the work.

E. Certificates

1. SDS and CIS

F. Closeout Documents

1. Production Pile Driving Records: Submit pile driving records within 15 calendar days after completion of driving.

1.4 QUALITY ASSURANCE

A. Preservative Treated Piles: The contractor shall be responsible for the quality of treated wood products. The contractor shall provide the engineer with the inspection report of an independent inspection agency that offered products comply with applicable AWPA standards. Identify treatment on each piece by the quality mark of an agency accredited by the board of review of the American Lumber Standard Committee. Inspect all preservative-treated wood visually to ensure there are no excessive residual materials or preservative deposits. Materials shall be clean and dry or it will be rejected because of environmental concerns.

B. SDS and CIS: Provide Safety Data Sheets (SDS) and Consumer Information Sheets (CIS) associated with timber pile preservative treatment. Contractor shall comply with all safety precautions indicated on SDS and CIS.

C. Pesticide Applicators: Provide certifications for all individuals (applicators) who will be working with creosote products on site. All applicators shall be certified by the state or

environmental protection agency (EPA) (under the provisions of 40 CFR 171) to use wood preservatives and have completed an approved EPA training program on the use of creosote products.

D. Best Management Practices (BMPs): The producer of the treated wood products shall provide certification that Best Management Practices (BMPS) for the use of treated wood in aquatic environments were utilized including a written description and appropriate documentation of the BMPS utilized.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and store piles in accordance with AWPA M4. Comply with paragraph entitled "SDS and CIS." Special care shall be taken in supporting piles to prevent excessive bending stresses in the piles. Piles shall be carefully handled without dropping, breaking of outer fibers, and penetrating the surface with tools. Peaveys, cant hooks, pikes, and other pointed tools shall not be used in handling treated piles.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Piles: provide southern pine clean peeled, treated piles conforming to ASTM D25 and other requirements as specified. Piles shall be in one piece of the lengths as shown on the project drawings. Splices will not be permitted. Each treated pile shall be branded by the producer, in accordance with AWPA M6. Pile circumferences shall be as follows:

1. Boardwalk Piles: Minimum butt circumference measured at 3 feet from the butt end shall be 31 inches, as indicated on the project drawings.

B. Preservative Treatment: Treat piles in accordance with AWPA U1 to the retention and penetration for marine piling use category UC5B, and produce in accordance with WWPI MGT practices, as follows:

1. Waterborne preservative for marine piles, CCA - Chromated Copper Arsenate with 2.50 pounds per cubic foot retention.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Inspection of Piles: The contractor shall provide the necessary facilities for the proper inspection of each pile. Piles to be preservative treated will be inspected prior to treatment. Piles will be inspected at the shipping point or at the work site if so decided. Piles with specified variations in characteristics shall be placed in separate lots for inspection.

1. Piles shall be so marked or segregated into marked lots that there will be no possibility of error in assignment after they have been inspected. Piles damaged after inspection

may be subsequently rejected if damage is deemed sufficient for rejection. All rejected piles shall be removed as directed.

B. Inspection of the Preservative Treatment Process: Inspection of the preservative treatment process will be in accordance with AWPA M2. The contractor shall notify the engineer where preservative treatment will be done not less than 15 days prior to the start of the treatment and shall provide the necessary facilities for the proper inspection of the treatment process. Allow the engineer unlimited access to the plant and inspection privileges for each facet of the treating process.

C. Sampling and Testing:

1. Sampling and testing shall be performed by an approved testing organization adequately equipped to perform such services.

2. Sampling: Representative samples of preservatives for testing shall be obtained from storage containers using the methods described in AWPA A4. The analysis of wood treated with waterborne preservatives shall be done in accordance with AWPA A9.

3. Testing: Waterborne preservatives shall be tested for conformance to AWPA A9. The net retention and the penetration of preservatives in piles shall be determined as specified in AWPA M2 and the additional requirements listed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pile Driving Equipment: Pile driving equipment shall meet the following requirements.

1. Pile Driving Hammers: Pile driving hammers shall be steam, air or diesel drip, single-action, double-acting, differential-acting type, and vibratory. The size or capacity of hammers shall be as recommended by the manufacturer for the pile weights and soil formation to be penetrated. The pile hammer shall be of sufficient weight and energy to install the specified pile without damage into the soils expected to be encountered. Diesel powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period. Sufficient pressure shall be maintained at the hammer so that:

a. For double-acting hammers, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated;

b. For single-acting hammers, there is a full upward stroke of the ram; and,

c. For differential-type hammers, there is a slight rise of the hammer base during each upward stroke.

2. Leads: Leads are required and shall be fixed at the top and adjustable at the bottom. Swinging leads may be allowed if site conditions merit their use and are approved.

3. Driving Cap or Helmet and Cushion Block: Driving cap or helmet shall be an approved design and shall be capable of protecting pile heads, minimizing energy absorption, and transmitting hammer energy uniformly and consistently to piles. Place driving helmet or cap and cushion block combination between top of pile and the ram. Driving cap shall fit snugly on the top of piles and shall employ a cushion block to prevent impact damage to piles. The cushion block may be a solid or laminated softwood block with the grain parallel to the pile axis and enclosed in a close-fitting steel housing. The thickness of the block shall be suitable for the length of pile to be driven and the character of subsurface material to be encountered. If block is damaged, split, highly compressed, charred or burned, or has become spongy or deteriorated, replace with new block. Under no circumstances will the use of small wood blocks, wood chips, rope, or other material permitting excessive loss of hammer energy be permitted.

4. Pile Collars: Collars or bands for protecting pile butts against splitting, brooming, and other damage while being driven shall be of an approved design.

5. Jetting Equipment: Jetting shall not be permitted.

6. Vibratory Hammers: The use of vibratory hammers is dependent upon satisfactory driving of piles to the elevations indicated on the Contract Drawings. The size or capacity of hammers shall be as recommended by the manufacturer for the pile mass weight and soil formation to be penetrated. The hammer shall provide for maintaining a rigid connection between the hammer and the pile.

B. Piles: Inspect piles when delivered and when in the leads immediately before driving. Cut piles at cutoff grade with pneumatic tools by sawing or other approved method.

C. Driving Piles: A complete and accurate record of the driving of piles shall be compiled by the contractor for submission to the owner’s representative. When driving long piles of high slenderness ratio, special precautions shall be taken to ensure against overstressing and leading away from a plumb or true position. During driving, pile driving hammers shall be operated at all times at the rate and conditions recommended by the hammer manufacturer. Each pile shall be driven continuously and without interruption to the indicated tip elevation. Deviation from this procedure will be permitted only in case the driving is stopped by causes which reasonably could not have been anticipated. Piles shall be driven to the full penetration required where practicable to do so without damage to the piles. If found impracticable to drive any pile to the depth required, such pile shall be cut off and abandoned or pulled as directed. Driven piles which have a penetration of less than that specified are not satisfactory. Driving of piles beyond the point of refusal, as indicated by excessive bonding of the hammer or kicking of the pile shall not be attempted. Piles which have uplifted after driving shall be re-driven to grade after conclusion of driving in that general area. The use of followers or splices shall not be permitted except where specially authorized. After driving is completed, piles shall be "headed" or cut off normal at

the cutoff elevation at the slope indicated on the drawings. Headed treated piles shall be given two heavy coats of field preservative treatment. Cutoffs shall become the property of the contractor and shall be removed at his expense.

1. Tolerances in Driving Piles: Piles shall be accurately placed in the correct location and alignments both laterally and longitudinally and to the vertical lines as shown. At cutoff elevation, butts shall be within 3 inches laterally of the location indicated. Manipulation to move piles into position will not be permitted. A variation of not more than 0.25 inch per foot of pile length from the vertical for plumb piles will be permitted. The correct relative position of group piles shall be maintained by the use of templates or by other approved means. Inspect piles for heave. Piles shall be driven to the depths shown. Re-drive heaved piles to the required tip elevation. Remove and replace with new piles those damaged, misplaced, driven below the design cutoff, or driven out of alignment, or provide additional piles, driven as directed at no additional cost to the Owner.

2. Records: Keep a complete and accurate driving record of each pile driven. Indicate pile location, deviations from design location, diameter, original length, mudline elevation, tip elevation, cutoff elevation, penetration in blows per foot for the last 10 feet for production piles, hammer data including rate of operation, make, and size, and unusual pile behavior or circumstances experienced during driving such as re-driving, heaving, weaving, obstructions, jetting, and unanticipated interruptions. Make pile driving records available to the Owner's Representative, a minimum of 24 hours after each day of pile driving. Include in the construction records the wood species, preservative type, retention, and producer of installed treated timber.

D. Jetting of Piles: Jetting shall not be permitted.

E. Spudding of Piles: Spudding shall not be permitted.

F. Predrilling of Piles: Predrilling shall not be permitted.

3.2 PROTECTION

A. Protection of Piles: Square the heads and tips of piles to the driving axis. Laterally support piles during driving, but do not unduly restrain piles from rotation in the leads. Swinging leads will not be permitted. Where pile orientation is essential, take precautionary measures to maintain the orientation during driving. Handle, protect, and field treat piles in accordance with AWPA M4.

B. Damaged Piles: Driving of piles shall not subject them to damage. Piles which are damaged, split, broomed, or broken by reason of internal defects or which are improperly driven below cutoff elevation so as to impair them for the purpose intended shall be removed and replaced. Minor damaged areas of treated piles shall be brush-coated with the same preservative used to treat the piles.

C. On-Site Application of Wood Preservatives: All on-site application of wood preservatives must be performed by a person certified through an EPA approved training program for the application of wood treatment products in accordance with 40 CFR 171, regulated under 7 U.S.C.A. sections 136 to 136y, federal insecticide, fungicide, and rodenticide act (FIFRA). On-site treatment shall also be in accordance with AWPA M4, sections 1.5, 2.2, 2.3, and 3.1.

3.3 FIELD QUALITY CONTROL

A. Inspections: When inspections result in product rejection, the contractor shall promptly segregate and remove rejected material from the premises. The owner may also charge the contractor an additional cost of inspection or test when prior rejection makes re-inspection or retest necessary.

END OF SECTION 31 62 19

SECTION 31 68 13 – SOIL AND ROCK ANCHORS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work under this Section consists of drilling and installation of soil anchors as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary for the drilling and installation of anchors as indicated on the project drawings and specified herein.

1.2 GENERAL REQUIREMENTS

A. Submit drawings and detailed installation procedures and sequences showing complete details of the installation procedure and equipment; anchor fabrication; grouting methods; grout mix designs; anchor and casing placement and installation; corrosion protection for bond length, stressing length and anchorage; anchorage and trumpet; stressing and testing procedures with lengths, forces, deformations, and elongations for the approval by the Owner's Representative. Shop drawings for anchors must include locations and details of the spacers, centralizers, and banding. If different types of anchors are to be installed, each anchor type must be readily identifiable. Once reviewed by the Owner's Representative, no changes or deviation from shop drawings will be permitted without further review by the Owner's Representative. The work includes design, fabrication and installation of the soil anchor system. Install and fabricate the anchors as shown on the drawings. Prepare fabrication and installation drawings and an installation plan for approval. Soil anchors must be threaded bar or strand type.

1.3 DESIGN SCOPE OF WORK

A. Provide the design of the soil anchor system, which will be the Contractor's responsibility. General design criteria are shown on the drawings and given in paragraph Design Requirements. The materials, design, stressing, load testing, and acceptance must be in accordance with PTI DC35.1 and these specifications.

1. Soil anchors may be threaded bar or strand type. The Contractor is responsible for the design of the anchor and bearing plate, determining drilling methods, and determining hole diameter and bond length. Submit design computations and data for the soil anchors, bearing plates, and bond zones.

2. Include computations with drawings, design assumptions, calculations, and other information in sufficient detail to verify the design proposed. The design must be certified by a registered Professional Engineer with proven experience in design of soil anchor components as stated in paragraph Qualifications. Include calculations for the stressing frames.

3. The Owner's Representative will approve the design calculations. Approval of the design calculations will not relieve the Contractor of responsibility for unsatisfactory performance of the installed soil anchors. Furnish all design computations at least 30 calendar days prior to the proposed commencement of drilling. The complete design, including design computations, fabrication and installation drawings and installation plan, must be certified by a registered Professional Engineer and must be submitted for approval.

4. Submit a plan for installing the soil anchors for review and comment. The proposal must describe the sequence for installation and other restrictions as outlined on the drawings or specified. Determine the anchor and casing installation procedures as part of the anchor design. Include the installation plan with descriptions of methods and equipment to be used for alignment checking of anchor holes and casings.

1.4 ANCHOR DESIGN

A. Design the individual soil anchors to meet the following criteria:

Anchor Location	As indicated
Horizontal Spacing	As shown on the drawings and required for design
Hole Diameter	8 inches minimum, 12 inches maximum
Design Load	Service loads as shown on the drawings
Assumed Soil-Grout Bond Strength	Varies per soil layer and boring zone. See the geotechnical report.
Minimum Unbonded Length	As required by design and testing
Minimum Required Bond Length	As required by design and testing
Maximum Bond Length	As required by design and testing
Corrosion Protection	Class I, Encapsulated Tendon
Angle of Anchor Inclination	As shown on the drawings

B. Design Load: The Design Load must not exceed 60 percent of the ultimate strength of the prestressing steel. The Lock-off Load must not exceed 70 percent of the ultimate strength of the prestressing steel. The maximum Test Load must not exceed 80 percent of the ultimate strength of the prestressing steel. The designer should include consideration of group effect of closely spaced anchors when determining design load and minimum spacing. Design the bearing plates so that the bending stresses in the plate do not exceed the yield strength of the steel when a load equal to 95 percent of the minimum specified ultimate tensile strength of the prestressing steel is applied and so that the average bearing stress on the structure does not exceed 3500 psi. Design the anchorage assembly connection to the structure in accordance with ACI 318.

C. Design Schedule: Submit a design schedule for the anchors which includes the following:

1. Anchor number.
2. Anchor design load.
3. Type and size of tendon.
4. Minimum total anchor length.
5. Minimum bond length.
6. Minimum tendon bond length.
7. Minimum unbonded length.
8. Details of corrosion protection, including details of anchorage and installation.
9. Submit the design schedule at least 30 days prior to commencement of work on the anchors covered by the schedule.

1.5 SITE CONDITIONS

A. A foundation investigation has been conducted at the site by the Geotechnical Engineer and data is presented on the foundation exploration drawings. Logs of soil borings are shown on the drawings. While the foundation information is representative of subsurface conditions at the respective locations, local variations in the characteristics of the subsurface materials may be anticipated. Local variations which may be encountered include, but are not limited to, classification and thickness of rock strata, fractures, and other discontinuities in the rock structure, and variation in the soil classifications. Such variations will not be considered as differing materially within the purview of the contract clauses, paragraph differing site conditions The contractor is responsible for verifying the location of all utilities that may be affected by construction or the installation of the anchors.

1.6 DEFINITIONS

A. The following definitions are in addition to those given in PTI DC35.1, Section 2.0:

1. Anchored Structure: The wall, foundation or other structure to which the anchor is to transfer force.
2. Demonstration Test Anchor: An anchor which is performance tested to verify design assumptions and installation practices.

1.7 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

B. American Concrete Institute (ACI)

ACI 301	(2016) Specifications for Structural Concrete
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)

C. American Society for Testing and Materials (ASTM)

ASTM A53	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A416	(2018) Standard Specification for Low-Relaxation, Seven-Wire for Prestressed Concrete
ASTM A500	(2020) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A536	(1984; R 2019; E 2019) Standard Specification for Ductile Iron Castings
ASTM A572	(2021; E 2021) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A722	(2015) Standard Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete
ASTM C33	(2018) Standard Specification for Concrete Aggregates
ASTM C109	(2021) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C144	(2018) Standard Specification for Aggregate for Masonry Mortar
ASTM C150	(2020) Standard Specification for Portland Cement
ASTM C1107	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D1248	(2016) Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D1784	(2020) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D1785	(2015; E 2018) Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D3350	(2021) Polyethylene Plastics Pipe and Fittings Materials
ASTM D4101	(2017) Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

D. Post-Tensioning Institute (PTI)

PTI DC35.1	(2014) Recommendations for Prestressed Rock and Soil Anchors
PTI TAB.1	(2006) Post-Tensioning Manual

1.8 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

1. Preconstruction Submittals

   Designer Qualifications

   Fabricator Qualifications

   Installer Qualifications

2. Shop Drawings

   Fabrication and Installation Drawings

3. Product Data

   Installation Equipment

   Installation Plan

   Manufacturer’s Instructions

4. Design Data

   Design Computations

   Anchor Design

Design Schedule

5. Test Reports

   Prestressing Steel

   Cement Grout Mixture Proportions

6. Certificates

   Prestressing Steel

   Cement

   Bearing Plate

   Corrosion Inhibiting Compound

7. Closeout Submittals

   Driller Logs

   Anchor Records

1.9 QUALITY ASSURANCE

A. Submit anchor designer, fabricator and installer qualifications for approval in accordance with paragraph SUBMITTALS. The submittals must, where applicable, identify individuals who will be working on this contract and their relevant experience. No changes must be made in approved personnel without prior approval of the Owner's Representative.

B. Designer Qualifications: The anchors must be designed by Professional Engineers who have designed a minimum of three soil anchors projects similar in size and scope to this project within the past ten years. The drawings and calculations must be signed by the Professional Engineer licensed in the state of North Carolina.

C. Fabricator Qualifications: The anchors must be fabricated by a manufacturer that has been in the practice of designing and fabricating soil anchors similar in size and scope to this project for at least ten years.

D. Installer Qualifications: Submit the qualifications and experience records for approval. In the experience record, identify all the individuals responsible for the anchors and must include a listing of projects of similar scope performed within the specified period along with points of contact. Qualifications prior to the installation of any anchors specified in this section. The anchors must be installed by a firm which is regularly engaged in the installation of soil anchors and has at least ten years experience in the installation of similar

anchors. The superintendent must have installed anchors on at least five projects of similar scope and size.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Materials must be suitably wrapped, packaged or covered at the factory or shop to prevent being affected by dirt, water, oil, grease, and rust. Protect materials against abrasion or damage during shipment and handling. Place materials stored at the site above ground on a well-supported platform and covered with plastic or other approved material. protect materials from adjacent construction operations. Grounding of welding leads to prestressing steel will not be permitted. Reject and remove from the site prestressing steel which is damaged by abrasion, cuts, nicks, heavy corrosions, pitting, excessive heat, welds or weld spatter. Inspect tendons prior to insertion into anchor holes for damage to corrosion protection. Repair any such damage in a manner recommended by the tendon manufacturer and approved by the Owner's Representative. Lifting of pre-grouted tendons must be to manufacturers' recommendations and not cause excessive bending, which can debond the prestressing steel from the surrounding grout.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Prestressing Steel: Submit certified test reports for each heat or lot of prestressing steel with materials delivered to the site. Strands must conform to PTI DC35.1-14 Section 4.2.1. Submit mill reports and a certificate from the manufacturer stating chemical properties, ultimate strengths, yield strengths, modulus of elasticity, and any other physical properties needed for the required computations, for the type of steel furnished.

1. High-Strength Steel Bars: ASTM A722, Type II, meeting all supplementary requirements.

2. Strand: ASTM A416, Grade 270, low relaxation strand. Do not weld strand.

B. Structural Steel: ASTM A572, Grade 50.

C. Steel Pipe: ASTM A53, Type E or S, Grade B.

D. Steel Tube: ASTM A500.

E. Ductile Iron Castings: ASTM A536.

F. Polyethylene Tubing

1. Smooth Polyethylene Tubing: ASTM D3350 or ASTM D1248, Type III.

2. Corrugated Polyethylene Tubing: PTI DC35.1-14 Section 4.7, with average minimum wall thickness of 0.06 inch.

G. Smooth Polypropylene Tubing: ASTM D4101, designation PP 210 B5542-11.

H. Polyvinyl Chloride (PVC) Pipe: ASTM D1785, Schedule 40.

I. Polyvinyl Chloride (PVC) Tubing

1. Smooth Polyvinyl Chloride (PVC) Tubing: ASTM D1784. Class 12454 or 13464.

2. Corrugated Polyvinyl Chloride (PVC) Tubing: Manufactured from rigid PVC compounds conforming to ASTM D1784, Class 13464-8 with average minimum wall thickness of 0.04 inch.

J. Heat Shrinkable Sleeve: Radiation crosslinked polyolefin tube internally coated with an adhesive sealant and conforming to PTI DC35.1-14 Section 4.8.1.

K. Corrosion Inhibiting Compound: The corrosion inhibiting compound must conform to the requirements of Section 4.6 of PTI DC35.1-14.

2.2 MANUFACTURED UNITS

A. Anchor Head: Anchor head must consist of steel bearing plate with wedge plate and wedges for strand anchors or steel bearing plate with nut for bar anchors, trumpet and corrosion protection. Submit bearing plate material and details.

Anchorage devices must be capable of developing 95 percent of the guaranteed ultimate strength of prestressing steel. The anchorage devices must conform to the static strength requirements of Section 3.1.6 (1) and Section 3.1.8 (1) and (2) of PTI TAB.1. Wedges must be designed to not cause premature failure of the prestressing steel due to notching or pinching. Fabricate the trumpet used to provide a transition from the anchorage to the unbonded length corrosion protection from steel pipe or steel tube. The minimum wall thickness must be 0.125 inch for diameters up to 4 inches and 0.20 inch for larger diameters. Weld the trumpet to the bearing plate.

B. Prestressing Steel Couplers: Prestressing steel couplers for bars must be capable of developing 100 percent of the minimum specified ultimate tensile strength of the prestressing steel. Splicing of strand will not be permitted.

C. Centralizers and Spacers: Fabricate centralizers and spacers from plastic, steel or other approved material which is nondetrimental to the prestressing steel. Do not use wood. The centralizer must be able to support the tendon in the drill hole and position the tendon so a minimum of 0.5 inch of grout cover is provided. Centralizers and spacers must permit grout to freely flow up the drill hole.

D. Casing: Casing must be steel pipe or steel tube selected and sized by the Contractor where required. Casing must be the necessary type and size to permit proper drilling of anchor holes and placing of anchors as specified herein and shown on the drawings. Straightening

of casings and machining of joints may be necessary in order to meet specified alignment tolerances.

2.3 EQUIPMENT

A. The Contractor's Quality Control manager must verify that the equipment used on site is the same as the equipment submitted for approval. Submit catalog cuts, brochures, or other descriptive literature describing the equipment to be used for drilling, grouting, handling, and installing the soil anchors. Submit sketches, drawings or details showing the access and temporary supports where required for the drilling equipment and stressing frames. Provide descriptions of stressing jacks, gages, dynamometers, load cells, or other devices for measuring stressing load, certified calibration records for each set of jacking equipment, and current testing curves for stress measurement gages which show that gages have been calibrated for the jacks for which they are used 30 days prior to the start of the testing operations.

B. Drilling Equipment: Provide drilling equipment suitable for advancing the drill tools to the depths and at the alignment specified.

C. Grouting Equipment

1. Grout Mixer: Grout mixer must conform to PTI DC35.1-14 Section 7.8.1.

2. Grout Pump: The grout pump must be of the positive displacement type, and must be capable of pumping at all flow rates below 20 gpm, must be capable of pumping at the pressure of at least 50 psi at zero flow rate. For neat cement grout, the pump must have a screen with 0.125 inch maximum clearance to sieve the grout before being introduced into the pump. Screens are not required for shear type mixers. Make available a pump which is capable of pumping both neat cement grout mixes and sanded grout mixes. The pumping equipment must have a pressure gage capable of measuring pressures of at least 150 psi or twice the required grout pressure, whichever is greater.

D. Stressing Equipment: Stressing equipment must be hydraulically operated and must have a capacity sufficient to stress the anchors to the required Test Loads within the rated capacity in one stroke. Pumps must be capable of applying each load increment in less than 60 seconds and must be capable of maintaining the hydraulic pressure within 50 psi. The equipment must permit stressing of the tendon in increments and raising or lowering the load in the tendon. Stressing equipment for strands must be capable of stressing all elements equally and simultaneously. Calibrate the equipment with an accuracy of +2 percent and ensure that the calibration certificate and graphs must be available at the site. The production gage must have graduations of 100 psi or less. Maintain a second certified gage for periodic verification of the production gage. Provide a dial gage or approved device to measure total tendon elongation at each load increment to the nearest 0.001 inch. The dial gage must be capable of measuring the entire anchor movement without being reset.

Verify the calibration of gages no more than 30 calendar days prior to commencing work under this contract and at six-month intervals throughout the period of use.

E. Testing Equipment: Provide testing equipment consisting of a hydraulic jack with calibrated pressure gage for applying the load and a dial gage or vernier scale to measure anchor movement. The ram travel of the stressing equipment must be not less than the theoretical elastic elongation of the total anchor length at the maximum Test Load. Graduate the pressure gage in 100 psi increments. Calibrate the stressing equipment and pressure gage as a unit no more than 30 calendar days prior to commencing work under this contract and at six-month intervals throughout the period of use. The movement measuring device must have a minimum travel equal to the theoretical elastic elongation of the total anchor length at the maximum Test Load without resetting the device.

2.4 GROUT

A. Cement: ASTM C150/C150M, Type I or II.

B. Water: Provide fresh, clean, potable water free from injurious amounts of sewage, oil, acid, alkali, salts, or organic matter.

C. Aggregates: Fine aggregate for sand-cement grout must conform to ACI 301 and ASTM C33/C33M for grout for backfilling holes or ASTM C144 for grout for pregrouting. Aggregates must not contain substances which may be deleteriously reactive with alkalis in the cement.

D. Admixtures: Admixtures which control bleed, improve flowability, reduce water content and retard set may be used in the grout subject to the approval of the Owner's Representative. Any admixtures used must be compatible with the prestressing steel and must be mixed in accordance with the manufacturer's recommendations.

E. Grout for Anchors

1. Cement Grout: Cement grout must conform to PTI DC35.1-14 Section 6.11 and Section 7.8.2.3. Submit cement grout mixture proportions.

F. Grout for Anchor Pads: Use nonshrink grout conforming to ASTM C1107/C1107M for leveling bearing plates.

2.5 TENDON FABRICATION

A. General: Fabrication of the anchors must be as recommended by the suppliers. Completely assemble anchors with all centralizers, spacers, grout and vent tubes and corrosion protection prior to insertion into the hole. Protect, transport and store fabricated anchors in a manner to prevent contamination or damage to any components.

B. Tendon: Locate all spacers for multiple element tendons as indicated on the approved shop drawings. Furnish strands full length with no splicing or coupling permitted. Tendon material must be unblemished and free of pitting, nicks, grease, or injurious defects. When required to maintain the tendon location within the hole, provide centralizers at a maximum of 10 foot intervals center-to-center throughout the bond length. Provide spacers at a maximum 10 foot intervals center-to-center throughout the bond length. The entire bond length of the tendon must be free of dirt, lubricants, loose rust, corrosion-inhibiting coatings or other contaminants.

C. Bond Breaker: Bond breaker for free stressing length of unbonded anchors must consist of smooth polyethylene tubing, minimum wall thickness 0.04 inch, or smooth PVC tubing, minimum wall thickness 0.04 inch.

D. Vent Tubes: Vent tubes used during grouting operations, if necessary, must be any appropriate type for the job, as recommended by the supplier of the anchors.

E. Grout Tubes: Grout tubes must be polyethylene tubing or as recommended by the anchor manufacturer and approved by the Owner's Representative. Inside diameter of grout tubes must be adequate to fully grout the entire hole.

F. Corrosion Protection: Corrosion protection must be as indicated. Provide corrosion protection for the entire anchor and include anchorages covers and trumpets filled with corrosion inhibiting compound or grout and encapsulation of the free stressing length and bond length.

1. Anchorage Protection: The trumpet must be sealed to the bearing plate and must overlap the free stressing length encapsulation by at least 4 inches. The trumpet and anchorage cover must be completely filled with corrosion inhibiting compound or grout. Compound filled trumpets must have a permanent seal between the trumpet and the free length corrosion protection.

2. Free Stressing Length Encapsulation: Encapsulation for free stressing length must consist of a sheath of smooth polyethylene tubing, minimum wall thickness 0.06 inch; smooth polypropylene tubing, minimum wall thickness 0.06 inch; smooth PVC tubing, minimum wall thickness 0.04 inch; steel pipe or tube with minimum wall thickness 0.20 inch or corrugated tubing conforming to paragraph Bond Length Encapsulation. Sheath for bars and strands may be heat shrinkable sleeve with a minimum thickness of 0.024 inch. Free stressing length encapsulation must extend at least 4 inches into the trumpet, but must not contact the bearing plate during testing and stressing of the tendon. Where corrugated tubing is used for sheath for unbonded anchors, a separate bond breaker must be provided.

3. Bond Length Encapsulation: Bond length encapsulation must consist of corrugated polyethylene tubing, minimum wall thickness 0.060 inch or corrugated PVC tubing, minimum wall thickness 0.040 inch.

2.6 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Perform required material tests, on prestressing steel and accessories, by an approved laboratory to demonstrate that the materials are in conformance with the specifications. Test grout in accordance with ASTM C109/C109M. These tests will be at the Contractor's expense. Furnish to the Owner's Representative, prestressing steel test results prior to beginning fabrication of any anchors and within 24 hours of testing.

PART 3 - EXECUTION

3.1 DRILLING HOLES

A. GENERAL: The top of bond zone elevations and other physical conditions indicated on the drawings are the result of soil sampling and core borings. (See also paragraph "PROJECT SITE CONDITIONS"). Drill holes at the locations and inclinations shown and to the depths and diameters determined by the Contractor to provide the design bond length and capacity indicated on the drawings. The locations of the holes may be changed only as approved by the Owner's Representative. Any redesign of the anchored structure due to relocation of anchor holes must be performed by the Contractor. Unless otherwise specified, The Contractor must determine the drilling method to be used. Do not drill holes within 50 feet of a grouted hole until the grout has set at least 24 hours. Take care while drilling to avoid damage of any kind to the existing structures. Damages of any nature will be evaluated by the Owner's Representative and repairs or replacements must be made as required. Collect, recycle, or treat waste water from drilling operations; do not discharged directly into the river or on the ground.

B. Drilling Through Existing Structures: Drill holes through existing structure by core drilling equipment to prevent or any method which does not cause damage to the surrounding structure. The Contractor is advised that foreign material, including metals and other materials remaining from original construction of the existing structure, may be encountered during drilling through existing structures.

C. Drilling in Soil: Holes in soil may be drilled by rotary drilling, rotary percussive, or vibratory driven casing. Holes in soil must be provided with steel casing where required for support of the surrounding material.

D. Casing: Utilize casing for drilling through unstable soil formations. Advance the casing by rotary drilling or driving.

E. Records: Submit driller logs and records as specified in paragraph Driller Logs.

F. Alignment

1. Tolerances: The anchor hole must be located within 6 inches of the plan location. The entry angle must be within 3 degrees of the specified inclination. The alignment of the drilled hole must be within 3 degrees of the theoretical alignment. Check tolerance for

each anchor hole. If the hole alignment is not within these tolerances, the hole must be backfilled with cement or sand-cement grout and a new hole drilled adjacent to the rejected hole. If tolerances cannot be maintained, then notify the Owner's Representative.

3.2 INSTALLATION OF ANCHORS

A. General: The Contractor is responsible for each drilled hole until the anchor has been installed, grouted, stressed and accepted. Holes in rock and casings must be cleaned by pressurized air and/or water to remove drill cuttings and mud. The anchors designated as demonstration test anchors must be installed and tested prior to drilling the bond zone for other anchors within the area represented by the demonstration test anchor.

B. Placing: All the equipment used in handling and placing the anchors must be such that it does not damage or deteriorate the prestressing steel, corrosion protection, or the anchorages. Each anchor must be inspected prior to insertion into the hole. Any damage to corrosion protection must be repaired prior to insertion or, if determined by the Contractor's Design Engineer to be not repairable, the anchor must be replaced. Insertion of anchors must be in accordance with PTI DC35.1.

C. Grouting of Soil Anchor: Within the bond length, grout placement must proceed such that the hole is filled in a manner to prevent air voids. The soil anchor hole must be progressively filled with grout and maintained completely full from bottom to top of the zone until the grout has set. Grouting of a soil anchor hole must be performed within 48 hours of the time the hole is drilled. Grouting may be accomplished through the casing pipe, grout tubes, hollow-stem augers or hollow drill rods. The grouting procedure used must provide soil anchors which meet the specified design capacity. Post-grouting will normally result in higher bond values.

1. Gravity Grouting: Gravity grouting must proceed from the bottom of the hole to the top of the hole.

2. Pressure Grouting: The method of pressure grouting must be determined by the Contractor and proven in the demonstration anchor. Production anchors must be grouted using the methods and target pressures that were used on the acceptable demonstration anchor. Grouting pressures and pumping rates must be controlled to prevent ground surface heave or fracturing. Grouting pressures must be incrementally increased until a refusal is reached or an acceptable amount of grout is pumped.

3. Post-Grouting: The number of phases of post-grouting must be determined by the Contractor and proven in the demonstration anchor. Production anchors must be grouted using the methods and target pressures that were used on the acceptable demonstration anchor. Grouting pressures and pumping rates must be controlled to prevent ground surface heave or fracturing. Grouting pressures must be incrementally increased until a refusal is reached or an acceptable amount of grout is pumped.

D. Anchorage Installation: The bearing plate and anchor head or nut must be installed perpendicular to the tendon, within 3 degrees, and centered on the tendon without bending of the stressing steel. Wedges, wedge holes and tendons must be free of dirt, grout or other contaminants. Corrosion protection must be maintained intact at the anchorage and any damage must be repaired prior to stressing.

3.3 STRESSING

A. General Requirements: After the anchor grout has reached sufficient strength in accordance with the Contractor's design the specified strength, as verified by grout cube break, the anchors must be stressed. Prior to stressing, surfaces upon which the stressing equipment is resting must be clean and the stressing equipment must be aligned as nearly with the center of the hole as possible. An Alignment Load of 10 percent of the Design Load must be applied to the anchor prior to setting dial gauges. Stress the anchor in accordance with the anchor manufacturer's recommendation, subject to the approval of the Owner's Representative. Design and Lock-off loads are given on the drawings. Determine the lock-off procedure so that the lift-off results meet the acceptance criteria specified in paragraph Acceptance. The maximum stress must never exceed 80 percent of the guaranteed ultimate strength of anchor steel. The process of stressing the anchors must be so conducted that accurate elongation of the anchor steel can at all times be recorded and compared with the computations submitted to, and accepted by the Owner's Representative. Stressing elements of strand anchors must be stressed simultaneously. Safety precautions must be taken to prevent workers from being behind or in front of the stressing equipment during stressing. Stressing of the anchors must be performed in a sequence submitted by the Contractor for review by the Owner's Representative. At no time during the stressing and testing of an anchor will the stressing equipment be disconnected from the temporary stressing head or anchor.

B. Lock-off: After completion of the all required tests, the load must be returned to the Alignment Load and the specified Lock-off Load must be applied to the anchor. A lift-off test must be made to verify the load in the anchor tendon before the tendon is locked-off and the stressing equipment is removed. The lift-off reading must be within five percent of the specified lock-off load. If the lift-off reading is not within five percent of the specified lock-off load, the anchorage will be reset and another lift-off reading must be made. This procedure must be repeated until a satisfactory lift-off reading is obtained. After lock-off, the trumpet must be filled with grout and the anchorage recess must be fully grouted flush with the adjacent surfaces.

3.4 FIELD QUALITY CONTROL

A. The first three anchors and a minimum of 2 percent of the remaining anchors must be designated as demonstration test anchors in each boring zone. Designated demonstration test anchors must be used to verify soil quality and the adequacy of the Contractor's anchor design and installation procedures. Demonstration test anchors must pass the performance test prior to placing other anchors within the section represented by the respective demonstration test anchor. All other anchors must be proof tested. During the stressing of

each anchor, a record must be kept of gage pressure and of anchor elongation at each stage of stressing to the specified test or Lock-off Load, as applicable. The Test Load must not be exceeded. Final acceptance of each anchor will be made by the Owner's Representative. All field testing shall be done at the Contractor's expense.

B. Performance Test: Performance test must consist of cyclically and incrementally loading and unloading the anchor, and must be conducted in accordance with PTI DC35.1, Paragraph 8.3.2. During the testing of each anchor, a record must be kept of gage pressure and of anchor elongation at each stage of stressing to each Test Load required by PTI DC35.1. Measurements of the elongation of prestressing steel must be made in accordance with PTI DC35.1. If the total movement at the end of 10 minutes at the Test Load exceeds 0.040 inch, the Test Load will be held an additional 50 minutes and the movement readings will be taken at the interval specified in PTI DC35.1, Paragraph 8.3.2. Test records, including plots and graphical analysis of test data, must be furnished upon acceptance of each performance tested anchor in accordance with paragraph SUBMITTALS.

C. Proof Test: Proof test must consist of incrementally loading the anchor and will be conducted in accordance with PTI DC35.1, Paragraph 8.3.3. During the testing of each anchor, a record must be kept of gage pressure and of anchor elongation at each stage of stressing to the Test Load required by PTI DC35.1. Measurements of the elongation of prestressing steel must be made in accordance with PTI DC35.1. If the total movement at the end of 10 minutes at the Test Load exceeds 0.040 inch, the Test Load must be held an additional 50 minutes and the movement readings will be taken at the interval specified in PTI DC35.1, Paragraph 8.3.3. Test records, including plots and graphical analysis of test data, must be furnished upon acceptance of each proof tested anchor in accordance with paragraph SUBMITTALS. The proof test results will be compared with similar anchors in which performance tests have been performed. If any significant variation from the proof tests occurs, the Owner's Representative may require additional performance tests.

D. Driller Logs: Submit the original handwritten log and a digital copy within two days of the completion of each hole. Keep accurate driller logs and records of all work accomplished under this contract and deliver complete copies of these logs and records to the Owner's Representative upon completion of the work or at such other time or times as he may be directed. All such records must be preserved in good condition and order by the Contractor until they are delivered and accepted, and the Owner's Representative will have the right to examine such records at any time prior to their delivery. Separate logs must be made for each hole. The following information must be included on the logs or in the records for each hole:

1. Hole number or designation and elevation of top of hole.

2. Inclination of the hole.

3. Make and manufacturer's model designation of drilling equipment.

4. Dates and time when drilling operations were performed.

5. Time required for drilling each run.

6. Elevation of top of rock.

7. Steel casing seat elevation.

8. Depths and elevations at which core was recovered or attempts made to core including top and bottom depth of each run.

9. Geologic classification or description by depths of each stratigraphic unit cored. This classification or description must be made immediately following the taking of the core.

10. Percentage of core recovered and rock quality designation per run.

11. Depth and elevation of rod drops and other unusual occurrences.

12. Depth and elevation at which groundwater is encountered.

13. Depths and elevations at which drill water is lost and regained and amounts.

14. Depth and elevation of bottom of hole, determined by measuring the drill steel length.

E. Anchor Records: Upon completion of installation of each anchor, the anchor records must be furnished to the Owner's Representative with top of bond zone elevation, bond length, free stressing length of anchor, grout mix, grouting pressure, bags of cement injected grout volume, and a report of performance test or proof test results. The performance test and proof test results must include measured lengths of drill holes and anchors, the loads and elongations recorded during testing, monitoring and stressing of the anchors, and graphs of test results.as specified in paragraph SUBMITTALS. In addition as-built drawings showing the completed installation of the anchors must be furnished upon completion of installation of all anchors.

3.5 ACCEPTANCE

A. General: Acceptance of anchors must be determined by the Owner's Representative. The following criteria will be used in determination of the acceptability of each anchor:

1. Creep: Creep movement must not exceed 0.040 inch at maximum Test Load during the first 10 minutes of the performance or proof test. If the creep movement exceeds this limit, it must not exceed 0.080 inch at the maximum Test Load at the end of 60 minutes. If the creep movement exceeds 0.080 inch at the maximum Test Load at the end of 60 minutes, the anchor will be rejected.

2. Movement: Apparent free length must be calculated from the observed elastic movement in accordance with PTI DC35.1, Section 8.6.2.

a. Minimum Apparent Free Length: The calculated free length must be not less than 80 percent of the designed free tendon length plus the jack length. If the anchor does not meet this criteria, the anchor must be restressed from the Alignment Load to the Test Load and the apparent free length must be recalculated. If the anchor does not meet this criteria after 3 attempts (original plus 2 restresses), the anchor will be rejected.

b. Maximum Apparent Free Length: The calculated free length must be not more than 100 percent of the designed free tendon length plus 50 percent of the bond length plus the jack length. If the anchor does not meet this criteria, and the cause of the behavior is not investigated and explained to the satisfaction of the Owner's Representative, the anchor will be rejected.

3. Initial Lift-Off Reading: The initial lift-off reading must be within 5 percent of the specified Lock-off Load. If the anchor does not meet this criteria, the anchor must be adjusted as necessary and the lift-off reading must be repeated.

B. Replacement of Rejected Anchors: Any anchor that fails the performance or proof test or is rejected by the Owner's Representative must be replaced. A replacement anchor, including a new anchor hole, must be provided by the Contractor at no expense to the Owner. The location of the replacement anchor will be as directed by the Owner's Representative in accordance with the redesign of the anchored structure. Provide all materials, supplies, equipment, and labor necessary to provide a new anchor assembly to the satisfaction of the Owner's Representative. No drilling will be performed for a replacement anchor until the grouting of all rock anchors within 50 feet of the replacement anchor location has been allowed to set for at least 24 hours. Payment will not be made for rejected or failed anchors. Either remove failed anchors and thoroughly ream and clear the anchor hole or remove the load and cut the anchor and casing flush.

END OF SECTION 31 68 13

SECTION 31 80 00 - CLEAN-UP AND SEEDING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Erosion Control: Section 02120

1.2 DESCRIPTION

A. The work covered by this section consists of disposal of waste and debris, preparing seedbeds, furnishing, placing, and covering limestone, fertilizer, and seed; compacting seedbeds; furnishing, placing, and securing mulch; and other operations necessary for the permanent establishment of grasses from seed; all in accordance with these specifications and drawings.

B. Waste will be considered to be all excavated materials which are not utilized in the construction of the project.

C. Debris will be considered to be all undesirable material encountered or left on the project site.

D. Permanent Seeding is required for all areas disturbed by construction, except for areas covered by structures, pavements, etc.

E. Temporary Seeding of disturbed areas shall be performed whenever one or more of the following conditions exist.

1. The Engineer determines that temporary seeding is necessary to prevent or stop erosion of disturbed areas.
2. Work is suspended or delayed on any portion of the project for 15 calendar days (10 calendar days within NCDOT right of way) and the potential for erosion exists.
3. Whenever permanent seeding is delayed beyond that required by the Contract Documents.

F. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth of the grasses.

G. In all operations covered by this section, care shall be taken to preserve the required line, grade, and cross section of the work area.

1.3 QUALITY ASSURANCE

A. All work done in this section shall be performed in accordance with all applicable Sections and Provisions of the North Carolina State Department of Transportation Standard Specifications for Roads and Structures, latest revision.

B. All materials required in this section shall meet or exceed the requirements of Division X: Section 1060 of the North Carolina State Department of Transportation Standard Specifications for Roads and Structures, latest revision.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fertilizer:

1. Provide commercial fertilizer conforming to statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture for all seeding/sodding.

B. Limestone: Provide agricultural limestone conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

C. Seed: Provide seed conforming to all statutory requirement and all rules and regulations adopted by the North Carolina Board of Agriculture.

1. Provide seed in accordance with requirements shown below. Deliver to site in original containers, labeled to show that the requirements of the N.C. Seed Law are met.
2. Quality of seed shall conform to the following:

Common Name	Minimum Seed Purity %	Minimum Germination %	Maximum Weed Seed %
Grasses			
Fescue Tall (KY.-31)	98	90	1.00
Common Bermudagrass	98	90	1.00

3. Seed containing prohibited noxious weed seed shall not be accepted. Seed shall be in conformance with state seed law restrictions for restricted noxious weeds.
4. If seed of the accepted quality cannot be bought, secure prior approval before making changes or exceptions.

D. Mulch:

1. Mulch for erosion control shall consist of grain straw or other acceptable material, and shall have been approved by the Architect/Engineer before being used. All mulch shall be reasonably free from mature seedbearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Bermuda Grass, Cortalaria, and Witch weed, and free of excessive amount of restricted noxious weeds as defined by the North Carolina Board of Agriculture at the time of use of the mulch. Also there shall be compliance with all applicable State and Federal domestic plant quarantines. Straw mulch that is matted or lumpy shall be loosened and separated before being used.
2. Material for holding mulch in place shall be asphalt or other approved binding material applied in accordance with this section.

PART 3 – EXECUTION

3.1 GENERAL

A. Follow procedures set forth in the publication “Guide for Sediment Control on Construction Sites in North Carolina” by the United States Department of Agriculture, Soil Conservation Service, and as specified herein.

B. Scarify soil to a depth of three (3) inches and work into a satisfactory seed bed by disking, use of cultipackers, harrows, drags and other approved means.

C. Preparation outlined above shall not be done when the soil is frozen, wet or otherwise in an unfavorable condition.

D. Begin and complete seeding operations as outlined below as soon as possible after final grading is completed, but in no event later than 15 calendar days after completion of final grading.

E. Disturbed areas within the right of way of the North Carolina Department of Transportation shall be graded, dressed, seeded, mulched, and tacked with liquid asphalt or other approved means within 10 calendar days of completion of work in any area.

F. Seeding and mulching operations shall not begin until electrical service has been installed within the project, unless directed by the Engineer.

G. Distribute lime and fertilizer, uniformly over seed bed and harrow, rake, or otherwise work same into seed beds.

H. Distribute seed uniformly over seed bed. Cover seed lightly after seeding.

I. No lime, fertilizer, or seed shall be applied during a strong wind, when soil is wet or otherwise unworkable. Should rain follow seeding before rolling is begun, the bed shall not be rolled.

J. The kinds of seed and the rates of application of seed, fertilizer, and limestone shall be as stated below.

1. Seeding Schedule: See L2.1

3.2 WASTE MATERIAL DISPOSAL

A. Waste material not utilized in the construction of the project shall be removed from the project site and disposed of by the Contractor in areas provided by him.

B. The Contractor shall hold the Owner harmless of any damages which might occur through the disposal of the waste and debris.

C. Construction debris and all broken concrete, masonry, etc. shall be removed from the project as soon as possible.

D. Where the Owner has granted permission to dispose of waste and debris within the project area, the Owner will have authority to establish whatever additional requirements that may be necessary to insure the satisfactory appearance of the area.

3.3 SEEDING AND MULCHING

A. Seeding and mulching shall be performed in accordance with all applicable provisions of Section 1660 of the North Carolina State Department of Transportation's Standard Specifications for Roads and Structures, latest revision.

B. Seeding and mulching shall be done on all earth areas disturbed by construction not destined for construction of structures or paving.

C. Apply mulch immediately after permanent seeding at a uniform rate sufficient to achieve approximately 80% coverage of ground surface. Care must be taken to prevent the mulch from being applied too thickly and smothering the seedlings. Mulch for temporary seeding should be applied based upon the recommendations of the Soil Conservation Service for the particular type of seed to be used.

D. Denuded slopes must be seeded within 21 calendar days (10 calendar days within NCDOT right of way) following completion of any phase of development.

3.4 TEMPORARY SEEDING

A. Temporary seeding shall be performed in accordance with the requirements of Section 01620 of the North Carolina State Department of Transportation's Standard Specifications for Roads and Structures, latest revisions and with Soil Conservation Service recommendations with regard to seed type, rate of application, fertilizer, etc.

B. The kinds of seed and the rates of application of seed and fertilizer shall be as stated below.

1. Seeding Schedule

Date		
Apr 15 – Aug 14	German Millet	50 lbs./Acre
Aug 15 - Apr 14	Rye (Grain)	120 lbs./Acre

2.	Year Round	Fertilizer 10-10-10 Analysis	1000 lbs./acre

3.5 TEMPORARY MULCHING

A. Temporary mulch may be used for the prevention of excessive soil erosion during construction operations where it is impossible or impractical to perform permanent seeding and mulching.

B. Temporary much shall be placed promptly at the location and times directed by the Engineer.

C. The temporary mulch may be required on previously seeded areas or on areas which have not been seeded.

D. Temporary mulches may be straw, fiber mats, netting or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious material. Mulch shall be spread uniformly over the area by hand or by means of approximate mechanical spreaders or blowers to obtain an application satisfactory to the Engineer. On seeded areas, satisfactory application of temporary mulch shall allow some sunlight to penetrate and air to circulate, but also partially shade the ground, reduce erosion and conserve soil moisture.

E. When temporary mulching is being performed in connection with temporary seeding, no seeded areas shall be allowed to remain more than 24 hours without mulching having been completed.

F. If seeding has been performed previously, care shall be exercised to prevent displacement of soil or seed, or other damage to the seeded area during temporary mulching operations.

G. The Contractor shall take sufficient precautions to prevent temporary mulch from entering pipe lines and drainage structures through displacement by wind, water or other causes.

H. The Contractor shall apply a sufficient amount of asphalt or other type material to assure that the temporary mulch is properly held in place.

I. In the application of asphalt materials during temporary mulching operations, adequate precautions shall be taken to prevent damage to traffic; and to any private or public property. Such property shall be adequately covered, or application methods changed, so as to avoid damage. Where any damage occurs as a result of the Contractor's failure to take adequate precautions, the Contractor will be required to repair such damage, including any cleaning that may be necessary, before final acceptance of the work will be made.

3.6 REPAIR SEEDING & MAINTENANCE

A. Maintain the grass on the areas for a period of 90 days after the grass growth appears. Reseed bare areas and repair all eroded areas during that period.

B. Inspect all seeded areas and make necessary repairs or reseedings within the planting season, if possible. If stand should be over 60% damaged, reestablish following original lime, fertilizer and seeding recommendations.

C. All areas which do not exhibit satisfactory ground cover within 45 days of seed application shall be replanted.

D. Repair seeding shall be performed in accordance with the requirements of Section 1661 of the North Carolina State Department of Transportation's Standard Specifications for Roads and Structures, latest revision.

E. The kinds of seed and fertilizer shall be the same as specified for permanent "seeding and mulching". The rates of application of the various kinds of seed specified for "seeding and mulching" may vary as directed by the Engineer, however the total rate shall be substantially the same as for "seeding and mulching", but in no case will the total rate of seed and fertilizer vary more or less than twenty-five (25%) percent of that specified for "seeding and mulching".

3.7 SUPPLEMENTAL SEEDING

A. The work covered by this section consists of the application of additional seed to an area already seeded with permanent seed but on which there is not a satisfactory cover of grass.

B. The work of supplemental seeding does not include seedbed preparation, fertilizer, limestone, or mulch, and is intended only to provide an additional amount of seed to the Fertilizer Top dressing operation on projects that do not have a stand of grass thick enough to cover the ground in a reasonable length of time. This work does not conflict with nor replace repair seeding as its purpose is entirely different.

C. The kinds of seed shall be the same as for "seeding and mulching", and the rate of application may vary from 25 pounds to 75 pounds per acre. The final rate per acre; if needed, will be determined by the Engineer prior to the time of top dressing and the Contractor will be notified in writing of the rate per acre, total quantity needed and areas on which to apply the supplemental seed.

3.8 FERTILIZER TOP DRESSING:

A. Fertilizer top dressing shall be performed in accordance with the requirements of Section 1665 of the North Carolina State Department of Transportation's Standard Specifications for Roads and Structures, latest revision.

END OF SECTION 31 80 00

SECTION 32 12 00 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Pavement-marking paint.

B. Related Sections include the following:

C. Section "Earthwork" for aggregate base courses and aggregate pavement shoulders.

1.2 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the state or of authorities having jurisdiction.

B. Standard Specification: NCDOT Standard Specifications for Roads and Structures, Current edition.

C. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: For each job mix proposed for the Work.

C. Shop Drawings: Indicate pavement markings and lane separations.

D. Material Test Reports: Indicate and interpret test results for compliance of materials with requirements indicated.

E. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

1.4 QUALITY ASSURANCE

A. Quality assurance shall be in accordance with the most current version NCDOT Standard Specifications for Roads and Structures, Section 609.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.6 **PROJECT CONDITIONS**

A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - **PRODUCTS**

2.1 **AGGREGATES**

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: As specified in NC DOT Standard Specifications for Roads and Structures, Section 1005

C. Fine Aggregate: As specified in NC DOT Standard Specifictions for Roads and Structures, Section 1012.

D. Mineral Filler: As specified in NC DOT Standard Specification for Roads and Structures, Section 610.

2.2 **ASPHALT MATERIALS**

A. Asphalt Cement: As specified in NC DOT Standard Specifications for Roads and Structures, Section 600.

B. Prime Coat: As specified in NC DOT Standard Specifications for Roads and Structures, Section 600.

C. Tack Coat: As specified in NC DOT Standard Specifications for Roads and Structures, Section 605.

D. Water: Potable.

2.3 **AUXILIARY MATERIALS**

A. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA). Provide granular, liquid, or wettable powder form.

B. Sand: In accordance with NC DOT Standard Specifications for Roads and Structures, latest edition.

C. Paving Geotextile: Nonwoven polypropylene, specifically designed for paving applications, resistant to chemical attack, rot, and mildew.

D. Pavement-Marking Paint: In accordance with the most current version NCDOT Standard Specifications for Roads and Structures.

1. Color: As indicated.

2.4 MIXES

A. Asphalt Concrete Surface Course: Provide in accordance with NC DOT Standard Specifications for Roads and Structures, Section 645, Type SF 9.5B, unless otherwise noted on drawings.

B. Asphalt Concrete Binder Course: Provide in accordance with NC DOT Standard Specifications for Roads and Structures, Section 640, Type I 19.5B. Binder course required only if indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll sub-base using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction. The Engineer shall witness and approve the proof-rolling prior to paving.

C. Notify Engineer in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected and approved by the Engineer.

3.2 PATCHING AND REPAIRS

A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.

1. Tack coat faces of excavation and allow to cure before paving.
2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

B. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

C. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch. Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.

D. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. of surface.

1. Allow tack coat to cure undisturbed before paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat when formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted-aggregate base at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure for 72 hours minimum.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.
3. If surface course can be applied less than 30 days following aggerate base installation, the prime coat is not required.

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in number of lifts and thicknesses indicated.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide, except where infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat.
2. Offset longitudinal joints in successive courses a minimum of 6 inches.
3. Offset transverse joints in successive courses a minimum of 24 inches.
4. Construct transverse joints by bulkhead method or sawed vertical face method as described in Asphalt Institute's "The Asphalt Handbook."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 1559, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 **INSTA**LLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 **PAVEMENT MARKING**

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow paving to cure for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.9 **FIELD QUALITY CONTROL**

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.

1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 1559, and compacted according to job-mix specifications.
2. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
3. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, but in no case will fewer than 3 cores be taken.

b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 32 12 00

SECTION 32 13 00 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Curbs and gutters, valley gutters.
2. Walkways.
3. Concrete base for pavers.
4. Concrete Pavement- ADA Parking Area
5. Concrete for Trench Drains

B. Related Sections include the following:

1. Section "Earthwork" for subgrade preparation, grading, and subbase course.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.3 SUBMITTALS

A. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

B. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Admixtures.
3. Curing compounds.
4. Applied finish materials.
5. Bonding agent or adhesive.
6. Joint fillers.

C. Joint Plan: The Contractor shall submit a crack control plan that conforms to the following guidelines:
1. The length of a panel should not be more than 25% greater than its width.
2. Maximum spacing should be about 30 times the thickness of the slab up to a maximum of 15 ft.
3. The depth of the joint shall be at least 1/4 of the slab thickness when using a conventional saw, or 1 in. (25 mm) when using early-entry saws.

4. The width shall be the narrowest permissible for the joint sealant used per the manufacturer's written installation guidelines.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: For walkways and vehicular pavements comply with ACI 330, "Guide for the Design and Construction of Concrete Parking Lots," except where otherwise specified. For all provisions not modified by these contract documents, adhere to ACI 330.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. All construction shall comply with ANSI A117.1 for accessibility.

PART 2 – PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

C. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 618, Class F or C.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

D. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

1. Class: 4S.
2. Maximum Aggregate Size: 3/4 inch (19 mm) nominal.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

E. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

F. Air-Entraining Admixture: ASTM C 260.

G. Water-Reducing Admixture: ASTM C 494, Type A.

H. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

I. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

J. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.3 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

H. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

I. Products: Subject to compliance with requirements, provide one of the following:

1. Evaporation Retarder:

   a. Cimfilm; Axim Concrete Technologies.
   b. Finishing Aid Concentrate; Burke Group, LLC (The).
   c. Spray-Film; ChemMasters.
   d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
   e. Sure Film; Dayton Superior Corporation.
   f. Eucobar; Euclid Chemical Co.
   g. Vapor Aid; Kaufman Products, Inc.
   h. Lambco Skin; Lambert Corporation.
   i. E-Con; L&M Construction Chemicals, Inc.
   j. Confilm; Master Builders, Inc.
   k. Waterhold; Metalcrete Industries.
   l. Rich Film; Richmond Screw Anchor Co.
   m. SikaFilm; Sika Corporation.
   n. Finishing Aid; Symons Corporation.
   o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.

2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:

   a. AH Curing Compound #2 DR; Anti-Hydro International, Inc.
   b. Res-X Cure All Resin; Burke Group, LLC (The).
   c. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
   d. Day-Chem Rez Cure; Dayton Superior Corporation.
   e. Kurez DR; Euclid Chemical Co.
   f. Nitocure S; Fosroc.
   g. #64 Resin Cure; Lambert Corporation.
   h. L&M Cure DR; L&M Construction Chemicals, Inc.
   i. 3100-Clear; W. R. Meadows, Inc.
   j. Seal N Kure FDR; Metalcrete Industries.
   k. Rich Cure; Richmond Screw Anchor Co.
   l. Resi-Chem C309; Symons Corporation.
   m. Horncure 30; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
   n. Uni Res 150; Unitex.
   o. Certi-Vex RC; Vexcon Chemicals, Inc.

3. Clear Waterborne Membrane-Forming Curing Compound:

   a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
   b. Aqua Resin Cure; Burke Group, LLC (The).
   c. Safe-Cure Clear; ChemMasters.
   d. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
   e. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
   f. Nitocure S; Fosroc.
   g. Aqua Kure-Clear; Lambert Corporation.

h. L&M Cure R; L&M Construction Chemicals, Inc.
i. 1100 Clear; W. R. Meadows, Inc.
j. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
k. Rich Cure E; Richmond Screw Anchor Co.
l. Resi-Chem Clear Cure; Symons Corporation.
m. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
n. Hydro Cure; Unitex.
o. Certi-Vex Enviocure; Vexcon Chemicals, Inc.

4. White Waterborne Membrane-Forming Curing Compound:

a. AH Curing Compound #2 WB WP; Anti-Hydro International, Inc.
b. Aqua Resin Cure; Burke Group, LLC (The).
c. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
d. Thinfilm 450; Kaufman Products, Inc.
e. Aqua Kure-White; Lambert Corporation.
f. L&M Cure R-2; L&M Construction Chemicals, Inc.
g. 1200-White; W. R. Meadows, Inc.
h. White Pigmented Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
i. Rich Cure White E; Richmond Screw Anchor Co.
j. Resi-Chem High Cure; Symons Corporation.
k. Horncure 200-W; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
l. Hydro White 309; Unitex.

2.4 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.5 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

1. Do not use Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:

1. Compressive Strength (28 Days): 4500 psi (27.6 MPa) unless otherwise noted on plans.
2. Maximum Water-Cementitious Materials Ratio: 0.4-0.5.
3. Slump Limit: 3-5 inches (75 mm).

a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 4.5 to 6 percent for exterior service.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

C. Upon completion of forms review forms for accessibility prior to conducting the concrete pour. Refer to the requirements of ANSI 117.1 when setting forms for concrete. Request a consultation with the Engineer prior to pouring in cases of uncertainty or if it appears the accessibility requirements cannot be met.

3.3 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
2. The joints must be straight, neat, and professional in accordance with the industry standard of care. Joints shall be free of irregularities and excessive variation in width, depth, and line to support adequate joint sealing and attractive appearance.
3. Joints must be formed within 6 hours of finishing.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

C. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

    a. Radius: 1/4 inch (6 mm).

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

D. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4 inch (6 mm).
2. Radius: 3/8 inch (10 mm).

3.4 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subgrade surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subgrade to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

I. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

J. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

K. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

L. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.5 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Refer to Landscape Architectural Plans for pedestrian concrete finish.

C. Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

2. Care shall be taken to finish the surface no more than necessary to remove irregularities. A fine broom or drag finish rather than a trowel finish is required to prevent trapping of bleed water and prevent scaling. Finish shall be consistent and relatively uniform. All edges, tooled joints, and isolation joints shall be rounded to the specified radius with appropriate tools.

3.6 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.7 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (9 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

C. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 00

SECTION 32 31 00 - WOVEN FIRE FENCE

PART 1 – GENERAL

1.1 WORK INCLUDED

A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the commercial welded wire architectural fence system defined herein at project site.

1.2 RELATED WORK

A. Section 31 00 00 - Earthwork
B. Section 32 13 00 - Concrete Pavement

1.3 SYSTEM DESCRIPTION

A. The manufacturer shall supply a total commercial welded wire architectural fence system. The system shall include all components (i.e., panels, brackets, posts, gates and hardware) required.

1.4 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus
C. ASTM D523 - Test Method for Specular Gloss
D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint
E. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus
F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
G. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates
H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test
J. ASTM F2919/F2919M – Standard Specification for Welded Wire Mesh Fence Fabric with Variable Mesh Patterns or Meshes Greater than 6 $in.^2$ in Panels

1.6 SUBMITTAL

A. The manufacturer's submittal package shall be provided prior to installation.

1.7 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

PART 2 – MATERIALS

2.1 MATERIAL

A. Steel material for fence posts shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.60 oz/ft^2, Coating Designation G-60. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

B. Steel wire mesh fence panels shall be welded by resistance welding per ASTM A185 using 6 gauge (0.192 inch) pre-galvanized steel wire, welded at each crossing to form rectangles. Vertical 6ga. (0.192) wires shall be spaced at 2 inches; horizontal 6ga. (0.192) wires shall be spaced at 6 inches. The cold rolled wire shall have a tensile strength of at least 70,000 PSI and 74,000 PSI weld shear strength. Wire strand shall be galvanized before welded (GBW), .050 ounces per square foot zinc coating conforming to the ASTM A641.

2.3 FABRICATION

A. Panels and posts shall be precut to specified lengths. Panels shall have a number of structural folds based on the specified panel height as follows:

1. 48” height x 96” width panel – 2 horizontal panel folds
2. 60” height x 96” width panel – 2 horizontal panel folds

B. The manufactured panels and posts shall be subjected to the thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (TBD). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

C. Swing gates shall be fabricated using 2” x 12ga square rails and gate ends. Gates that exceed 6’ in width will have a 2” sq. x 12ga. intermediate upright. All rail, upright, and gate end intersections shall be joined by welding. Steel gussets (1/4” x 2”) shall be welded at each rail to gate end intersection and rail to intermediate intersections (4 gussets per gate bay). Gusset shall be punched to accept gate trussing cable and turnbuckle.

PART 3 – EXECUTION

3.01 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

A. Fence post shall be spaced according to Table 3, plus or minus ¼”. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36” (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The “Earthwork” and “Concrete” sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering

analysis to be sufficient in strength for the intended application. Typical wind load data in Table 4 is to be used as a guideline. Table 4 is not to be used for specific application without engineering evaluation.

3.03 FENCE INSTALLATION MAINTENANCE

A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. Install per manufacturer's instructions and recommendations.

3.04 GATE INSTALLATION

A. Gateposts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 CLEANING

A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION 32 31 00

SECTION 32 40 00 - MANUFACTURED SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

B. The following related items of work are included under other Sections:

1. Site Clearing
2. Precast Concrete Unit Pavers
3. Concrete Pavement
4. Storm Drainage
5. Water Distribution

1.2 SUMMARY

A. The work required under this section consists of furnishing all labor, materials, equipment, services and related items necessary to supply and install Site Furnishings and Structures, and all related work, complete, as indicated on the drawings or specified herein.

B. Major items of work include, but are not limited to, supplying and installing:

a. 14’x 30’ x10’-2” Metal Pergolas
b. Metal Swing Arbors
c. Metal tables with attached seats
d. Seat Wall Bench Topper
e. Seat Wall Bench Topper Backrest
f. Bike Racks
g. Galvanized Steel Square Table
h. Anchored Swivel Wood Slat Chair
i. Duo Trash and Recycling Receptacle
j. Backless Benches
k. Backed Benches
l. Collapsible Bollard
m. Outdoor Drinking Fountain with Bottle Filling Station and Dog Bowl Filler
n. Outdoor Concrete Table Tennis Table
o. Outdoor Concrete Table Tennis Benches
p. Interpretive Signage Board Frame and Mounting
q. Metal Fencing
r. Metal Gates

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with 10-years experience in production of specified products.

B. Installer Qualifications: Installer shall be a firm having a minimum of five (5) years successful experience in the installation of Site Furnishings and Structures similar to the size, scope and

complexity of this project as shown and specified and who can demonstrate said experience through documented references.

C. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction and the OSHA. Field and laboratory testing should be performed in accordance with applicable standards, except where more stringent requirements are shown or specified:

ASTM Testing Standards:

ASTM B 117	Standard Practice for Operating Salt Spray (Fog) Apparatus.
ASTM D 522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
ASTM D 523	Standard Test Method for Specular Gloss.
ASTM D 2247	Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
ASTM D 2794	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
ASTM D 3359	Standard Test Methods for Measuring Adhesion by Tape Test.
ASTM D 3363	Standard Test Method for Film Hardness by Pencil Test.
ASTM G 155	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

ISO Testing Standards:

ISO 1520	Paints and Varnishes – Cupping Test.
ISO 2815	Paints and Varnishes – Buchholz Indentation Test.

ANSI/BIFMA Testing Standards:

ANSI/BIFMA X5.4-2005	Standard Test for Lounge Seating.

LFI Testing Standards:

LFI PT-019	Standard Test for Strength and Durability

1.4 SUBMITTALS

A. Manufacturer's Data & Shop Drawings

1. Submit fabrication data, shop drawings and/or catalogue cuts for each manufactured site furnishing specified.
2. Submit samples of materials, colors and finishes.
3. Shop drawings shall include, but not be limited to, depicting all materials and fastening methods in sizes and relationships as shown. All elevations shall be prepared at not less than 1/2" = 1'-0" and all details at not less than 3" = 1'-0".
4. Submit shop drawings for all custom site furnishings specified or illustrated on the drawings, for approval prior to fabrication.
5. Submit manufacturer’s standard warranty.
6. Submit manufacturer’s maintenance guide.

1.5 COORDINATION

A. Coordinate and cooperate with other Contractors to enable the work to proceed as rapidly and efficiently as possible.

B. Before any work is started, a conference shall be held between the Contractor and the Owner concerning the work under this Contract.

1.6 SUBSTITUTION AND REJECTION

A. The Owner reserves the right to reject material or work which does not conform to the Contract Documents. Rejected work shall be removed or corrected at the earliest possible time.

1.7 PROTECTION

A. The Contractor shall be responsible for work until finally inspected and accepted. After delivery and before and after installation, protect work against theft, injury or damage.
B. The Contractor shall protect work, equipment and material of all other trades from damage that might be caused by this work or workmen and shall pay for all such damage, should it occur.

PART 2 - PRODUCTS

2.1 GENERAL

A. All Site Furnishings shall be new and in perfect condition. After award of the Contract, and prior to beginning the work, the Contractor shall submit for approval, two copies of the complete list of materials which he proposes to install. Quantities of materials and equipment need not be included. Deviations from the specifications shall not be allowed.

2.2 MATERIALS

A. The following site furnishings shall be manufactured by the suppliers listed below or an approved equal, and shall meet the quality and style described below:

Warranty: Products will be free from defects in material and/or workmanship for a period of at least three years.

1. Metal Pergola
   a. Quantity: Two (2)
   b. Style: per detail
   c. Dimensions: 14’w x 30’l x 10’-2”h
   d. Material: Metal
   e. Mounting: Embedded Posts
   f. Metal Finish:
      Primer: Rust inhibitor on ferrous supports.
      Topcoat: Thermosetting TGIC polyester powder coat. UV, chip, flake resistant.
   g. Color: Submit samples to Landscape Architect for final selection.

2. Metal Swing Arbor
   h. Quantity: Three (3)
   i. Style: per detail Shall coordinate with Metal Pergola
   j. Dimensions: Roughly as shown – to be determined in shop drawing process
   k. Material: Metal

l. Mounting: Embedded Posts
m. Metal Finish:
Primer: Rust inhibitor on ferrous supports.
Topcoat: Thermosetting TGIC polyester powder coat. UV, chip, flake resistant.
n. Color: Submit samples to Landscape Architect for final selection.

3. Plaza Tables
o. Quantity: Four (4) (one with space for wheelchair)
p. Style:
q. Dimensions:
r. Material: Metal
s. Mounting: Surface Mount
t. Metal Finish:
Primer: Rust inhibitor on ferrous supports.
Topcoat: Thermosetting TGIC polyester powder coat. UV, chip, flake resistant.
u. Color: Submit samples to Landscape Architect for final selection.

4. Plaza Chairs
v. Quantity: Fifteen (15)
w. Style: with “Swivel” option
x. Dimensions: per detail
y. Material: Metal and Wood to match Plaza Tables
z. Mounting: Surface Mount
aa. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
bb. Color: Submit samples to Landscape Architect for final selection.

5. Backed Benches with Armrests
cc. Quantity: Nine (9) in base bid; additional Six (6) if Bid Additive 2 accepted
dd. Style: per detail
ee. Dimensions: per detail
ff. Material: per detail
gg. Mounting: Surface Mount
hh. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
ii. Color: TBD

6. Backless Benches with Armrests
b. Quantity: Four (4)
a. Style: per detail
b. Dimensions: per detail
c. Material: per detail
d. Mounting: Surface Mount
e. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
Color: TBD

7. Bike Rack
f. Quantity: Six (6)
g. Style: per detail

h. Dimensions: per detail
i. Material: per detail
j. Mounting: Surface Mount
k. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
l. Color: TBD

8. Trash/Recycling Receptacles
m. Quantity: Nine (9)
n. Style: per detail
o. Dimensions: per detail
p. Material: per detail
q. Mounting: Surface Mount
r. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
s. Color: TBD

9. Backless Seat Wall Toppers with Armrests
t. Quantity: Two (2
u. Style: per detail
v. Dimensions: 79” long (each)
w. Material: per detail
x. Mounting: per detail
y. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
z. Color: TBD

10. Seat Wall Toppers with Backrest and Armrests
aa. Quantity: Two (2)
bb. Style: per detail
cc. Dimensions: per detail
dd. Material: per detail
ee. Mounting: per detail
ff. Metal Finish: per detail
Primer: per detail
Topcoat: per detail
Color: TBD

11. Concrete Table Tennis Table
gg. Quantity: One (1)
hh. Style: per detail
ii. Dimensions: per detail
jj. Material: Concrete with polycoated Metal center net
kk. Mounting:
ll. Metal Finish:
Primer:
Topcoat:
Color: Submit samples to Landscape Architect for final selection.

12. Concrete Table Tennis Benches

Quantity:	Two (2)
Style:	per detail
Dimensions:	per detail
Material:	Concrete
Mounting:	
Metal Finish:	
Primer:	
Topcoat:	
Color:	Submit samples to Landscape Architect for final selection.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the subgrade, finished surfaces and installation conditions. Do not commence work until all unsatisfactory conditions are corrected.

3.2 LAYING OUT THE WORK

A. The trade performing the work of this section assumes full and sole responsibility for the accuracy and correctness of all layouts, lines, levels, grades and other aspects of the work under this section. Layout all work in accordance with the requirements, therefore, as indicated in the drawings.

3.3 INSTALLATION

A. Locate all site furnishings where indicated on the drawings and attach as detailed on the drawings and as elaborated upon in the specifications and in conformance with manufacturer's recommendation.

B. Any item locations not specifically detailed in the Contract Documents shall be located at the direction of the Landscape Architect.

C. Clean and touch-up paint all abraded, welded and scratched surfaces with matching paint provided by each site furnishing and structure manufacturer.

3.4 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work.

B. Remove from the project site and excess material and equipment at the completion of the work of this section.

C. Repair damage resulting from Site Furnishing and Structure installation work.

END OF SECTION 32 40 00

SECTION 32 90 00 - PLANTING & TOPSOIL

PART I – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all exterior planting as shown on the drawings or inferable therefrom and/or as specified in accordance with the requirements of the Contract Documents.

B. These specifications include standards necessary for and incidental to the execution and completion of planting, including hauling and spreading of topsoil, and finished grading as indicated on the prepared drawings and specified herein.

C. Protection of existing features. During construction, protect all existing trees, shrubs, and other specified vegetation, site features and improvements, structures, and utilities specified herein and/or on submitted drawings. Removal or destruction of existing plantings is prohibited unless specifically authorized by the owner.

1.2 APPLICABLE STANDARDS

A. *American National Standards for Tree Care Operations, ANSI A300*. American National Standards Institute, 11 West 42nd Street, New York, N.Y. 10036.

B. *American Standard for Nursery Stock, ANSI Z60.1*. American Nursery and Landscape Association, 1250 Eye Street. NW, Suite 500, Washington, D.C. 20005.

C. *Hortus Third*, The Staff of the L.H. Bailey Hortorium. 1976. MacMillan Publishing Co., New York.

D. All standards shall include the latest additions and amendments as of the date of advertisement for bids.

1.3 QUALIFICATIONS

A. Landscape planting and related work shall be performed by a firm with a minimum of five years experience specializing in this type of work. All contractors and their sub-contractors who will be performing any landscape work included in this section of the specification shall be approved by the Landscape Architect.

B. Landscape contractor shall be actively registered with the North Carolina Landscape Contractors registration board.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Certificates of inspection shall accompany the invoice for each shipment of plants as may be required by law for transportation. File certificates with the Landscape Architect prior to acceptance of the material. Inspection by federal or state authorities at place of growth does not preclude rejection of the plants at the site.

1.5 SUBMITTALS

A. Manufacturer's Data: Submit copies of the manufacturer's and/or source data for all materials specified, including soils, mulch and structural soil.

B. Samples: Submit samples of all topsoil, soil mixes, mulches, and organic materials. Samples shall weigh 1 kg (2 lb) and be packaged in plastic bags. Samples shall be typical of the lot of material to be delivered to the site and provide an accurate indication of color, texture, and organic makeup of the material.

C. Plant Photographs: Submit color photographs of representative specimens of each plant on the plant list. Photos shall be a minimum 3 x 5 in. taken from angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph. Label each photograph with the plant name, plant size, and name of the growing nursery.

D. Nursery Sources: Submit a list of all nurseries that will supply plants, along with a list of the plants they will provide and the location of the nursery.

E. Soil Test: Submit soil test analysis report for each sample of topsoil and planting mix from a soil testing laboratory approved by the Landscape Architect.
1. Provide a particle size analysis, including the following gradient of mineral content:

USDA Designation	Size in mm
Gravel	+2 mm
Very course sand	1-2 mm
Coarse sand	0.5 -1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	smaller than 0.002 mm

2. Provide a chemical analysis, including the following:
   a. pH and buffer pH
   b. Percentage of organic content by oven-dried weight.
   c. Nutrient levels by parts per million, including phosphorus, potassium magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil based on the requirements of horticultural plants.
   d. Soluble salt by electrical conductivity of a 1:2, soil: water, sample measured in millimho per cm.
   e. Cation exchange capacity (CEC).

1.6 PLANTING SEASON

A. Planting shall be done between October 01 and April 30.

B. Variance: If special conditions exist that warrant a variance in the above planting dates, a written request shall be submitted to the Landscape Architect stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of the Landscape Architect. Any variance in the planting season will not affect the guarantee period.

1.7 UTILITY VERIFICATION

A. The contractor shall contact the local utility companies for verification of the location of all underground utility lines in the area of the work. The contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement.

PART 2 – MATERIALS

2.1 TOPSOIL

A. All seed and sod areas shall have a minimum 6” of topsoil applied (depth after rolling).

B. All groundcover and ornamental grasses shall have a minimum 12” of topsoil applied (depth after rolling).

C. All shrub beds shall have a minimum 18” of topsoil applied (depth after rolling).

D. Existing topsoil may be used. It is the Contractor’s responsibility to test the existing topsoil to ensure that it meets the requirements listed below to promote vigorous and healthy establishment and growth of plants.

E. Imported topsoil may be used in quantities sufficient to complete the specified requirement.

F. Existing or imported topsoil shall be:
1. Fertile agricultural soil
2. Typical for locality
3. Capable of sustaining vigorous plant growth
4. Taken from drained sites
5. Free of subsoil, rock, stones, clay or impurities, plants, weeds and roots
6. pH value minimum 5.7, maximum 6.5
7. Organic content 5 to 7 percent

2.2 MATERIALS FOR SOIL AMENDMENT

A. Organic Matter
1. Leaf matter and yard waste composted sufficiently to break down all woody fibers, seeds, and leaf structures, and free of toxic and nonorganic matter. Organic matter shall be commercially prepared compost. Submit 0.5 kg (1 lb) sample and suppliers literature for approval.

B. Course Sand
1. Course concrete sand, ASTM C-33 Fine Aggregate, with a Fines Modulus Index of 2.75 or greater.

2. Sands shall be clean, sharp, natural sands free of limestone, shale and slate particles.

3. Provide the following particle size distribution:

Sieve	Percentage Passing
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 16 (1.18 mm)	50-85
No. 30 (0.60 mm)	25-60
No. 50 (0.30 mm)	10-30
No. 100 (0.15 mm)	2-10

C. Lime
1. Shall be ground, palletized, or pulverized lime manufactured to meet agricultural standards and contain a maximum of 60 percent oxide (i.e. calcium oxide plus magnesium oxide). Submit manufacturer literature for approval.

D. Sulfur
1. Shall be flowers of sulfur, pelletized or granular sulfur, or iron sulfate. Submit manufacturer literature for approval.

E. Fertilizer
1. Agricultural fertilizer of a formula indicated by the soil test. Fertilizers shall be organic, slow-release compositions whenever applicable. Submit manufacturer literature for approval.

2.3 PLANTS

A. Plants shall be true to species and variety specified and nursery-grown in accordance with good horticultural practices under climatic conditions similar to those in the locality of the project for at least two years. They shall have been freshly dug during the most recent favorable harvest season.

B. All plant names and descriptions shall be as defined in *Hortus Third*.

C. All plants shall be grown and harvested in accordance with the *American Standard for Nursery Stock*.

D. Unless approved by the Landscape Architect, plants shall have been grown not more than a 200-mile radius of the project unless the provenance of the plant can be documented to be compatible with the latitude and cold hardiness zone of the planting location.

E. Unless specifically noted, all plants shall be of specimen quality, exceptionally heavy, symmetrical, and so trained or favored in development and appearance as to be unquestionably and outstandingly superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well branched, and densely foliated when in leaf; free of disease and insects, eggs, or larvae; and shall have healthy, well-developed root systems. They shall be free from physical damage or other conditions that would prevent vigorous growth.

F. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, or cuts of limbs over 3/4 in. in diameter that are not completely closed will be rejected.

G. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the Landscape Architect. Use of larger plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.

H. Caliper measurements shall be taken on the trunk 6 in. above the natural ground line for trees up to and including 4 in. in caliper, and 12 in. above the natural ground line for trees over 4 in. in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of sizes is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Measurements specified are minimum sizes acceptable after pruning, where pruning is required. Plants that meet measurements but do not possess a standard relationship between height and spread, according to the *American Standards for Nursery Stock*, shall be rejected.

I. Substitutions of plant materials will not be permitted unless authorized in writing by the Landscape Architect. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price.

J. The plant list on the drawing, is for the contractor's information only, and no guarantee is expressed or implied that quantities therein are correct or that the list is complete. The contractor shall ensure that all plant materials shown on the drawings are included in his or her bid.

K. All plants shall be labeled by plant name. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Plant labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering.

L. Selection and Tagging
1. Plants shall be subject to inspection for conformity to specification requirements and approval by the Landscape Architect at their place of growth and upon delivery. Such approval shall not impair the right of inspection and rejection during progress of the work.
2. A written request for the inspection of plant material at their place of growth shall be submitted to the Landscape Architect at least ten calendar days prior to digging. This request shall state the place of growth and the quantity of plants to be inspected. The Landscape Architect may refuse inspection at this time if, in his or her judgment, sufficient quantities of plants are not available for inspection.
3. All plants shall be selected and tagged by the Landscape Architect at their place of growth. For distant material, photographs may be submitted for pre-inspection review.

M. Anti-Desiccants
1. Anti-desiccants, if specified, are to be applied to plants in full leaf immediately before digging or as required by the Landscape Architect. Anti-desiccants are to be sprayed so that all leaves and branches are covered with a continuous protective film.

N. Balled and Burlapped (B&B) Plant Materials
1. Trees designated B&B shall be properly dug with firm, natural balls of soil retaining as many fibrous roots as possible, in sizes and shapes as specified in the *American Standard for Nursery Stock*. Balls shall be firmly wrapped with nonsynthetic, rottable burlap and secured with nails and heavy, nonsynthetic, rottable twine. The root collar shall be apparent at surface of ball. Trees with loose, broken, processed, or manufactured root balls will not be accepted, except with special written approval before planting.

O. Container Plants
1. Plants grown in containers shall be of appropriate size for the container as specified in the most recent edition of the *American Standard for Nursery Stock* and be free of circling roots on the exterior and interior of the root ball.
2. Container plants shall have been grown in the container long enough to have established roots throughout the growing medium.

P. Bareroot and Collected Plants
1. Plants designated as bareroot or collected plants shall conform to the *American Standard for Nursery Stock*.
2. Bareroot material shall not be dug or installed after bud break or before dormancy.
3. Immediately after harvesting plants, protect from drying and damage until shipped and delivered to the planting site. Rootballs shall be checked regularly and watered sufficiently to maintain root viability.

Q. Transportation and Storage of Plant Material
1. Branches shall be tied with rope or twine only, and in such a manner that no damage will occur to the bark or branches.
2. During transportation of plant material, the contractor shall exercise care to prevent injury and drying out of the trees. Should the roots be dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn, the Landscape Architect may reject the injured tree(s) and order them replaced at no additional cost to the owner. All loads of plants shall be covered at all times with tarpaulin or canvas. Loads that are not protected may be rejected.
3. All bareroot stock sent from the storage facility shall be adequately covered with wet soil, sawdust, woodchips, moss, peat, straw, hay, or other acceptable moisture-holding medium, and shall be covered with a tarpaulin or canvas. Loads that are not protected in the above manner may be rejected.
4. Plants must be protected at all times from sun or drying winds. Those that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet mulch, or other acceptable material, and kept well watered. Plants shall not remain unplanted any longer than three days after delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled with suitable support of the soil ball to avoid damaging it.

R. Mechanized Tree Spade Requirements
1. Trees may be moved and planted with an approved mechanical tree spade. The tree spade shall move trees limited to the maximum size allowed for a similar B&B root-ball diameter according to the *American Standard for Nursery Stock* or the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller. The machine shall be approved by the Landscape Architect prior to use. Trees shall be planted at the designated locations in the manner shown in the plans and in accordance with applicable sections of the specifications.

2.3 MATERIALS FOR PLANTING

A. Mulch: At all planting areas, mulch shall be triple shredded hardwood bark mulch (non-dyed). Material shall be mulching grade, uniform in size, and free of foreign matter. Submit sample for approval.

B. Anti-desiccant: shall be an emulsion specifically manufactured for agricultural use, which provides a protective film over plant surfaces. Anti-desiccants shall be delivered in containers of

the manufacturer and shall be mixed according to the manufacturer's directions. Submit manufacturer literature for approval.

PART 3 – EXECUTION

3.1 EXCAVATION OF PLANTED AREAS

A. Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the Landscape Architect is required before excavation begins.

B. Tree, shrub, and groundcover beds are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped.

C. The sides of the excavation of all planting areas shall be sloped at 45 degrees. The bottom of all beds shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed. The bottom of the planting bed directly under any tree shall be horizontal such that the tree sits plumb.

D. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.

E. Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected overnight.

F. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 6 in. layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.

G. In areas of slowly draining soils, the root ball may be set up to 3 in. or 1/8 of the depth of the root ball above the adjacent soil level.

H. Save the existing soil to be used as backfill around the tree.

I. On steep slopes, the depth of the excavation shall be measured at the center of the hole and the excavation dug as shown on the drawings.

J. Detrimental soil conditions: The Landscape Architect is to be notified, in writing, of soil conditions encountered, including poor drainage that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received from the Landscape Architect.

K. Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the Landscape Architect.

3.2 INSTALLATION OF TOPSOIL

A. Prior to the installation of topsoil, install subsurface drains, irrigation main lines, lateral lines, and irrigation risers shown on the drawings.

B. The Landscape Architect shall review the preparation of subgrades prior to the installation or modification of topsoil.

C. Do not proceed with the installation of topsoil until all utility work in the area has been installed.

D. Protect adjacent walls, walks, and utilities from damage or staining by the soil. Use 1/2 in. plywood and/or plastic sheeting as directed to cover existing concrete, metal, masonry work, and other items as directed during the progress of the work.

E. Clean up any soil or dirt spilled on any paved surface at the end of each working day.

F. Any damage to the paving or architectural work caused by the soils installation contractor shall be repaired by the general contractor at the soils installation contractors expense.

G. Till the subsoil into the bottom layer of topsoil or planting mix.

H. Loosen the soil of the subgrade to a depth of 2 to 3 in. with a rototiller or other suitable device. Spread a layer of the specified topsoil 2 in. deep over the subgrade. Thoroughly till the topsoil and the subgrade together.

I. Immediately install the remaining topsoil in accordance with the following specifications:

1. Shrub and Groundcover Beds: Prepare specified depth of the approved topsoil graded to meet elevations indicated on engineering plans. Thoroughly roto-till and break up subsoil to a minimum of 6” depth. Remove debris, gravel, rocks and other deleterious material over 1” in diameter, within 12” of surface shrub beds and tree pits, from the project site.

2. Trees: For trees which are not located within topsoil shrub beds, prepare 2” of the approved topsoil in the future root zone area or each tree (minimum 8’ radius of trunk in all directions) and thoroughly till in to a depth of 6” – 8”.

J. Do not compact topsoil but do wet-soak planting areas to assure proper settlement. Replace topsoil to specified grade after watering, where necessary.

K. Protect the tilled area from traffic. Do not allow the tilled subgrade to become compacted.

L. In the event that the tilled area becomes compacted, till the area again prior to installing the planting mix.

M. Soils shall be thoroughly mixed and tilled with tractor driven PTO tiller unless impossible due to space constraints. In confined areas, heavy duty manual tiller will be used.

N. Topsoil shall not be stripped, transported, or graded if moisture content exceeds field capacity or if the soil is frozen.

O. Topsoil stockpiles shall be protected from erosion and contamination.

P. Subsoiling: When subsoiling is indicated on the drawings, use a chisel plow subsoil ripping tool mounted on a machine of sufficient power to make vertical trenches 18 in. deep into the subsoil 24 in. apart. Run the ripping tool over each area in opposite directions so that each area is ripped twice to thoroughly break up the compacted subgrade material prior to the installation of

topsoil. Install the remaining topsoil in 8- to 10-in. lifts to the depths and grades shown on the drawing. The depths and grades shown on the drawings are the final grades after soil settlement and shrinkage of the organic material. The contractor shall install the soil at a higher level to anticipate this reduction of soil volume, depending on predicted settling properties for each type of soil.

Q. Phase the installation of the soil such that equipment does not have to travel over already-installed topsoil or planting mixes.

R. Compact each lift sufficiently to reduce settling but not enough to prevent the movement of water and feeder roots through the soil. The soil in each lift should feel firm to the foot in all areas and make only slight heel prints. Over compaction shall be determined by the following field percolation test.
   1. Dig a hole 10 in. in diameter and 10 in. deep.
   2. Fill the hole with water and let it drain completely. Immediately refill the hole with water, and measure the rate of fall in the water level.
   3. In the event that the water drains at a rate less than 1 in. per hour, till the soil to a depth required to break the over compaction.
   4. The Landscape Architect shall determine the need for, and the number and location of percolation tests based on observed field conditions of the soil.
   5. Maintain moisture conditions within the soils during installation to allow for satisfactory compaction. Suspend installation operations if the soil becomes wet. Do not place soils on wet or frozen subgrade.
   6. Provide adequate equipment to achieve consistent and uniform compaction of the soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction.
   7. Add lime, sulfur, fertilizer, and other amendments during soil installation. Spread the amendments over the top layer of soil and till into the top 4 in. of soil. Soil amendments may be added at the same time that organic matter, when required, is added to the top layer of soil.
   8. Protect soil from over compaction after placement. An area that becomes over compacted shall be tilled to a depth of 6 in.. Uneven or settled areas shall be filled and regraded.

3.3 FINE GRADING

A. Grade the surface of all planted or lawn areas to meet the grades shown on the drawings or to be flush with the adjacent surface after the 12-month settling period. Set grades at time of installation high enough relative to the type of soil mix and settlement anticipated so that the soil will be at the correct grades after the settlement period. Adjust the finish grades to meet field conditions as directed.

B. Provide for positive drainage from all areas toward the existing inlets and drainage structures.

C. Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the drawings.

D. Fill all dips and remove any bumps in the overall plane of the slope.

E. The tolerance for dips and bumps in lawn areas shall be a 1/2 in. deviation from the plane in 10 ft.

F. The tolerance for dips and bumps in shrub planting areas shall be a 1 in. deviation from the plane in 10 ft.

G. All fine grading shall be inspected and approved by the Landscape Architect prior to planting, mulching, sodding, or seeding.

3.4 PLANTING OPERATIONS

A. Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil has been placed and tamped around the base of the root ball. Improper compacting of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

B. Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery.

C. If the root flare is less than 2 in. below the soil level of the root ball, plant at the tree the appropriate level above the grade to set the flare even with the grade. If the flare is more than 2 in at the center of the root ball the tree shall be rejected.

D. Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.

E. Remove plastic, paper, or fiber pots from containerized plant material. Pull roots out of the root mat, and cut circling roots with a sharp knife. Loosen the potting medium and shake away from the root mat. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting.

F. The roots of bare-root trees shall be pruned at the time of planting to remove damaged or undesirable roots (those likely to become a detriment to future growth of the root system). Bare-root trees shall have the roots spread to approximate the natural position of the roots and shall be centered in the planting pit. The planting-soil backfill shall be worked firmly into and around the roots, with care taken to fill in completely with no air pockets.

G. Cut ropes or strings from the top of shrub root balls and trees smaller than 3 in. caliper after plant has been set. Remove burlap or cloth wrapping and any wire baskets from around top half of balls. Do not turn under and bury portions of burlap at top of ball.

H. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.

I. Place existing topsoil and/or topsoil into the area around the tree, tamping lightly to reduce settlement.

J. For plants planted in individual holes in existing soil, add any required soil amendments to the soils, as the material is being backfilled around the plant. Ensure that the amendments are thoroughly mixed into the backfill.

K. For plants planted in large beds of prepared soil, add soil amendments during the soil installation process.

L. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning.

M. Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil.

N. Remove all tags, labels, strings, etc. from all plants.

O. Remove any excess soil, debris, and planting material from the job site at the end of each workday.

P. Form watering saucers 4 in. high immediately outside the area of the root ball of each tree as indicated on the drawings.

3.5 STAKING AND GUYING

A. Stake or guy a tree only when necessary for the specific conditions encountered and with the approval of the Landscape Architect or as noted on the drawings. Staking may be required in unusual circumstances such as sandy soils in either the root ball or adjacent soils or in extremely windy locations. Poor-quality trees with cracked, wet, or loose root balls, poorly developed trunk-to-crown ratios, or undersized root balls shall be rejected if they require staking, unless written approval to permit staking or guying as a remedial treatment is obtained from the Landscape Architect. Trees that settle out of plumb due to inadequate soil compaction either under or adjacent to the root ball shall be excavated and reset. In no case shall trees that have settled out of plumb be pulled upright using guy wires.

B. When required, staking and guying methods shall be approved by the Landscape Architect. If no staking or guying requirements appear on the drawings, submit for approval a drawing of the staking or guying method to be used. Stakes, anchors, and wires shall be of sufficient strength to maintain the tree in an upright position that overcomes the particular circumstances that initiated the need for staking or guying. Guy wires shall be galvanized, multistrand, twisted wire.

C. Where guy wires are attached around the tree, the trunk shall be protected with 3/4 in. diameter rubber hose, black in color, and of sufficient length to extend past the trunk by more than 6 in.

D. Stakes and guys shall be installed immediately upon approval or planting, and shall be removed at the end of the first growing season. Any tree that is not stable at the end of this time shall be rejected.

E. One tree shall be staked as a sample of the standard of work. The Landscape Architect shall approve the sample staking before the Contractor proceeds with the remaining trees to be staked.

3.6 WRAPPING

A. Wrap the trunk of any tree only when necessary for the specific conditions encountered and with the approval of the Landscape Architect. Wrapping may be required for thin-barked

species in unusual circumstances such as trees planted adjacent to South- or West-facing reflective surfaces, or when it is impossible to plant the tree with the trunk oriented to the same north orientation that it held in the growing nursery.

B. When required, wrapping methods shall be approved by the Landscape Architect. If no wrapping requirements appear on the drawings, submit for approval a drawing of the wrapping method to be used. Wrapping material shall be as specified in this specification. Wrapping material shall be fastened using a biodegradable tape. All tape shall be loosely wrapped around the wrapping material in single layer to permit its breakdown in sunlight and permit a minimum of 1 in. of unrestricted trunk growth. Stapling or tying the wrap with non- or slowly biodegradable tape or any synthetic or natural fiber string shall be prohibited.

C. Wrapping material shall be applied from the base of the tree to the first branch.

D. All wrapping material shall be removed no later than at the end of the year after planting or as specified by the Landscape Architect.

3.7 PRUNING

A. Plants shall not be heavily pruned at the time of planting. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear walks and roads. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant.

B. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears.

C. Except in circumstances dictated by the needs of specific pruning practices, tree paint shall not be used. The use of tree paint shall be only upon approval of the Landscape Architect. Tree paint, when required, shall be paint specifically formulated and manufacturing for horticultural use.

D. Pruning of large trees shall be done from a hydraulic man-lift such that it is not necessary to climb the tree.

3.8 MULCHING

A. All trees, shrubs, and other plantings will be mulched with mulch previously approved by the Landscape Architect. The mulch on trees and shrubs shall be to the depths shown on the drawing. Mulch must not be placed within 3 in. of the trunks of trees or shrubs.

B. Final grade of mulch shall be ½” below adjacent surface or steel edging to prohibit washout or migration of mulch to adjacent surface.

3.9 MAINTENANCE OF TREES, SHRUBS, AND VINES

A. Maintenance shall begin immediately after each plant is planted and continue until its acceptance has been confirmed by the Landscape Architect.

B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, tightening and repairing guys and stakes, resetting plants to proper grades or upright position, restoring of the planting saucer, and furnishing and applying such sprays or other materials as necessary to keep plantings free of insects and diseases and in vigorous condition.

C. Planting areas and plants shall be protected at all times against trespassing and damage of all kinds for the duration of the maintenance period. If a plant becomes damaged or injured, it shall be treated or replaced as directed by the Landscape Architect at no additional cost.

D. Watering: Contractor shall irrigate as required to maintain vigorous and healthy tree growth. Overwatering or flooding shall not be allowed. The contractor shall monitor, adjust, and use existing irrigation facilities, if available, and furnish any additional material, equipment, or water to ensure adequate irrigation. Root balls of all trees and large shrubs shall be spot watered using handheld hoses during the first four months after planting, as required to ensure adequate water within the root ball.

E. During periods of restricted water usage, all governmental regulations (permanent and temporary) shall be followed. The contractor may have to transport water from ponds or other sources, at no additional expense to the owner when irrigation systems are unavailable.

3.10 "AS-BUILT" DRAWINGS

A. Prepare an "As-Built" draw to show deviations from the bid documents made during construction. The drawings shall be delivered to the Landscape Architect before final acceptance of work. Upon approval of the "As-Built" drawings, the Prime Contractor shall be responsible for submittal of two (2) reproducible set of plans to the Owner.

3.11 FINAL ACCEPTANCE

A. The Landscape Architect shall inspect all work for acceptance upon written request of the contractor at the point of substantial completion. The request shall be received at least ten calendar days before the anticipated date of inspection.

B. Acceptance of plant material shall be for general conformance to specified size, character, and quality and shall not relieve the contractor of responsibility for full conformance to the contract documents, including correct species.

C. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect, the Landscape Architect shall certify in writing that the work has been accepted.

3.12 ACCEPTANCE IN PART

A. Work may be accepted in parts when the Landscape Architect and contractor deem that practice to be in their mutual interest. Approval must be given in writing by the Landscape Architect to the contractor verifying that the work is to be completed in parts. Acceptance of work in parts shall not waive any other provision of this contract.

3.13 GUARANTEE PERIOD AND REPLACEMENTS

A. The guarantee period for trees and shrubs shall begin at the date of final acceptance.

B. The contractor shall guarantee all plant material to be in healthy and flourishing condition for a period of one year from the date of final acceptance.

C. When work is accepted in parts, the guarantee periods extend from each of the partial acceptances to the terminal date of the guarantee of the last acceptance. Thus, all guarantee periods terminate at one time.

D. The contractor shall replace, without cost, as soon as weather conditions permit, and within a specified planting period, all plants determined by the Landscape Architect to be dead or in an unacceptable condition during and at the end of the guarantee period. To be considered acceptable, plants shall be free of dead or dying branches and branch tips and shall bear foliage of normal density, size, and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification.

E. The guarantee of all replacement plants shall extend for an additional period of one year from the date of the accepted replacement. In the event that a replacement plant is not acceptable during or at the end of said extended guarantee period, the Landscape Architect may elect subsequent replacement or credit for that item.

F. At the end of the guarantee, the contractor shall reset grades that have settled below the proposed grades on the drawings.

G. The contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program. If changes are recommended, they shall be submitted in writing to the Landscape Architect. Claims by the contractor that the Owners maintenance practices or lack of maintenance resulted in dead or dying plants will not be considered if such claims have not been documented by the Contractor during the guarantee period.

H. In the event of a necessary repair or replacement during the guarantee period, the Contractor is expected to respond in a timely manner.

I. At the end of the guarantee period and upon written request of the contractor, the Landscape Architect can inspect all guaranteed work. The request shall be received at least ten calendar days before the anticipated date of inspection. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect at that time, the Landscape Architect shall certify, in writing, that the guarantee period is complete.

END OF SECTION 32 90 00

SECTION 32 92 20 - FERTILIZING, SEEDING, MULCHING AND SODDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Permanent Seeding: Permanent seeding is required for all areas disturbed by construction, except for areas covered by structures, pavements, etc.

B. Sodding: Sodding is required to be installed in all irrigated lawn areas.

C. Temporary Seeding: Temporary seeding of disturbed areas shall be performed whenever one or more of the following conditions exist.
   1. The ENGINEER determines temporary seeding is necessary to prevent or stop erosion of disturbed areas.
   2. Work is suspended or delayed on any portion of the project for 30 days and the potential for erosion exists.
   3. Whenever permanent seeding is delayed beyond that required by the Contract Documents.

1.3 QUALITY ASSURANCE

A. Codes and Standards: In general, follow procedures and guides published by the Soil Conservation Service, United States Department of Agriculture.

PART 2 - PRODUCTS

2.1 FERTILIZER

A. Provide commercial fertilizer conforming to statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

2.2 LIMESTONE

A. Provide dolematic or hydrated limestone conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

2.3 SEED

A. Provide seed conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

B. Provide seed in accordance with requirements shown below. Deliver to site in original containers, labeled to show that the requirements of the N.C. Seed Law are met.

C. Quality of seed shall conform to the following:

Common Name	Minimum Pure Live Seed %	Maximum Total Other Crop Seed %	Maximum Total Weed Seed %
Grasses			
Tifway Bermudagrass	99	90	0.1

1. Seeding containing prohibited noxious weed seed shall not be accepted. Seed shall be in conformance with state seed law restrictions for restricted noxious weeds.
2. If seed of the accepted quality cannot be bought, secure prior approval before making changes or exceptions.

2.4 MULCH

A. Mulch for erosion control shall consist of grain straw or other acceptable material, and shall have been approved by the ENGINEER before being used. All mulch shall be reasonably free from mature seedbearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Bermuda Grass, Crotalaria and Witchweed, and free of excessive amount of restricted noxious weeds as defined by the North Carolina Board of Agriculture at the time of use of the mulch. Also there shall be compliance with all applicable State and Federal domestic plant quarantines. Straw mulch that is matted or lumpy shall be loosened and separated before being used.

B. Material for holding mulch in place shall be asphalt or other approved binding material applied in accordance with this section.

2.5 JUTE MESH

A. Use jute mesh on seeded areas where slope is steeper than 2 horizontal to one vertical (2:1 slope). Use woven jute yarn weighing approximately 90 lbs. per sq. yard and having ¾" openings.

2.6 SOD

A. The grass sod shall be per plans. Sod shall be TifTuff Bermuda. Premium quality grass and shall come from a field that is very sandy with a maximum of 10% silt and clay combined. Sod from a field of heavy soil will not be accepted. The sod shall be free from foreign grasses, other Bermuda strains, weeds and noxious nematodes. The sod shall be mowed to a uniform height of ¾ inch for a minimum of two weeks prior to harvest. The sod shall be cut with a soil layer of approximately 1/4 inch. The sod shall be harvested, delivered and transplanted within a period of 48 hours.

PART 3 - EXECUTION

3.1 GENERAL

A. Follow procedures set forth in the publication "Guide for Sediment Control on Construction Sites in North Carolina" by the United States Department of Agriculture, Soil Conservation Service, and as specified herein.

B. Scarify soil to a depth of three (3) inches and work into a satisfactory seed bed by discing, use of cultipackers, harrows, drags and other approved means.

C. Preparation outlined above shall not be done when the soil is frozen, wet or otherwise in an unfavorable condition.

D. Begin and complete seeding operations as outlined below as soon as possible after final grading is completed, but in no event later than 30 days after completion of final grading.

E. Distribute lime and fertilizer uniformly over seed bed and harrow, rake or otherwise work same into seed bed.

F. Distribute seed uniformly over seed bed. Cover seed lightly after seeding.

G. No lime, fertilizer or seed shall be applied during a strong wind, when soil is wet or otherwise unworkable. Should rain follow seeding before rolling is begun, the bed shall not be rolled.

3.2 PERMANENT SEEDING

A. Application of Lime, Fertilizer and Seed:
1. Apply lime at the rate of 2 tons per acre.
2. Apply fertilizer at a rate and analysis that will provide the following amounts of nutrients:

Nitrogen:	100 pounds per acre
Potash:	100 pounds per acre
Phosphorous:	100 pounds per acre

B. Apply 600 pounds per acre of 20% superphosphate or equivalent in addition to that listed above or use an analysis which will provide the additional phosphorous.

C. Provide permanent seeding in accordance with the following schedule:

Fescue	75 pounds per acre
Tifway Bermuda Grass	50 pounds per acre
Rye Grass	100 pounds per acre

3.3 SODDING

A. The soil shall be moistened immediately prior to laying the sod. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered to promote uniform growth and strength. Care shall be exercised to insure that sod is not stretched or overlapped and that all joints are butted tightly to prevent voids.

B. The sod shall be watered immediately after installation so that the first laid sod does not dry out until the entire field has been completely sodded.

C. After the sodding is completed, the entire sodded area shall be watered and rolled to insure good contact with the soil and to even up the surface.

3.4 TOP DRESSING

A. One week after completion of sodding, the contractor shall topdress the sodded area with topsoil to eliminate unevenness in the field. The topsoil shall be uniformly distributed at a rate to provide ¼ inch depth of topdressing over the entire sodded area.

3.5 TEMPORARY SEEDING

A. Seed in accordance with Soil Conservation Service recommendations with regard to seed type, rate of application, fertilizer, etc.

3.6 APPLICATION OF MULCH

A. Apply mulch immediately after permanent seeding at a uniform rate sufficient to achieve approximately 80% coverage of ground surface. Care must be taken to prevent the mulch from being applied too thickly and smothering the seedlings. Mulch for temporary seeding should be applied based upon the recommendations of the Soil Conservation Service for the particular type of seed to be used.

B. Mulch Anchoring:
1. On ground slopes less than 4%, anchor mulch with a straight blade disk or anchoring tool. Press mulch into soil about three inches. Operate equipment across slopes.
2. On ground slopes greater than 4%, apply asphalt with suitable applicator at a rate of not less than 150 gallons per ton of mulch.
3. Peg and twine anchoring may be used on steep slopes. Drive 8" wood stakes every 3 to 4 feet in all directions. Stretch in a crisscross and square in all directions. Secure twine around pegs and drive pegs flush with surface.

3.7 REPAIR AND MAINTENANCE

A. Maintain the grass on the area for a period of 90 days after the grass growth appears. Reseed bare areas and repair all eroded areas during that period.

B. Repairs: Inspect all seeded areas and make necessary repairs or reseedings within the planting season, if possible. If stand should be over 60% damaged, re-establish following original lime, fertilizer and seeding recommendations.

C. All seeded areas that do not exhibit satisfactory ground cover within 45 days of seed application shall be replanted.

D. For the first week after completion of the sodding operation, the contractor shall be responsible for conducting a watering program to provide soil moisture conducive to the growth of the grass and relative to the prevailing weather conditions. One week after installation, the contractor shall fertilize the entire sodded area with 16-4-8 fertilizer. The fertilizer shall be uniformly spread at a rate of 5 pounds per 1,000 square feet.

E. The contractor shall provide a detailed maintenance schedule for maintenance by the owner. The schedule shall cover the period from after the first week maintenance to the end of the first growing season.

END OF SECTION 32 92 20

SECTION 32 14 13 - PRECAST CONCRETE UNIT PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Concrete pavers and joint sand.
   2. Bitumen setting bed.
   3. Asphalt tack coat
   4. Cleaning and Sealing.

B. Related Sections
   1. Section 02320 Storm Drainage
   2. Section 02751 Cement Concrete Pavement

C. Allowances: The following are included under the allowances indicated as specified in Division 1 Section "Allowances":

   1. Pavers under the Paver Allowance.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. C-33, Specification for Concrete Aggregates.
   2. C-127, Test method for specific gravity and absorption of Course Aggregates.
   3. C-128, Test method for specific gravity and absorption of Fine Aggregates.
   4. C-136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   5. C-140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   6. C-144, Standard Specification for Aggregate for Masonry Mortar.
   7. C-150, Specification for Portland Cement.
   8. C-293, Flexural Strength.
   9. C-920, Specification for Elastomeric Joint Sealants.
   10. C-979, Standard Specification for Pigments for Integrally Colored Concrete.
   11. C-1028, Static Coefficient of Friction
   12. C-1262, Test Method for Evaluating Freeze-Thaw Durability
   13. C 1645, Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units.
   14. D-977, Standard Specification for Emulsified Asphalt.
   15. D-994, Specification for Preformed Expansion Joint Filler.
   16. D-1073, Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
   17. D-2028, Specification for Cutback Petroleum Asphalt
   18. D-3381, Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
   19. WTCL 99, Load Carrying Capacity.

B. Interlocking Concrete Pavement Institute (ICPI):
   1. ICPI Tech Spec Technical Bulletins

C. Tile Council of America (TCA)
   1. TCA F102, Installation Method Cement Mortar Bonded

D. American National Standards Institute (ANSI)
   1. ANSI A-118.4, Latex Portland Cement Mortar.
   2. ANSI A-118.6, Cement Grouts.

1.3 SUBMITTALS

A. In accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data:
   1. Manufacturer's drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, expansion and control joints, concrete paver layout, patterns, color arrangement, installation and setting details.
   2. Written instructions for recommended maintenance.
   3. Neoprene modified asphalt adhesive product catalog sheets with specifications.
   4. Bituminous setting bed: asphalt cement mix design to be used in the bituminous setting bed conforming to ASTM D 3381.
   5. Sieve analysis per C 136 for sand mixed with bitumen and sand for joints between concrete pavers.
   3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
   4. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM standards.
   5. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

F. Samples:
   1. Four representative full-size samples of each paver type, thickness, color, finish that indicates the range of color variation and texture expected in the finished installation. Colors selected by Landscape Architect from manufacturer's available colors.
   2. Pavement edge sample (min 18" l)
   3. Accepted samples become the standard of acceptance for the work.

G. Paver Installation Subcontractor:
   1. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.
   2. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. All products covered under this Section shall be produced by a single manufacturer, unless otherwise specified, with a minimum of fifteen (15) years proven production of this concrete paver product.

B. Installer Qualifications:
   1. Installer shall have a minimum of five (5) years proven specialized construction experience with this product and be capable of estimating and building from blueprint plans and details, in addition to proper material handling. All work must comply with local, state/provincial licensing and bonding requirements.
   2. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
   3. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

C. Mock-Ups:
   1. Install a 7 ft x 7 ft paver area.
   2. Use this area to determine surcharge of the bitumen-sand layer and adhesive, joint sizes, lines, laying pattern(s), color(s) and texture of the job.
   3. This area will be used as the standard by which the work will be judged.
   4. Subject to acceptance by owner, mock-up may be retained as part of finished work.

5. If mock-up is not retained, remove and properly dispose of mock-up.

1.5 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.
B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
   1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
   2. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
   3. Unload pavers at job site in such a manner that no damage occurs to the product.
D. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Store concrete paver cleaners and sealers per manufacturer's instructions.
   1. Cover joint sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
   1. Do not install bitumen setting bed or pavers during heavy rain or snowfall.
   2. Do not install bitumen setting bed and pavers over frozen base materials.
   3. Do not install frozen bitumen setting bed materials.
   4. Do not install concrete pavers on frozen bitumen setting bed materials.

1.7 MAINTENANCE

A. Extra Materials: Provide additional 100 SF material for use by owner for maintenance and repair.
B. Pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE UNIT PAVERS

A. Interlocking Concrete Paver Units, including the following:
   1. Sizes:
      a. Paver Type #1: Vehicular 24"x24"x x 3-1/8" thick
      b. Paver Type #2: Vehicular 24"x12" x 3-1/8" thick
      c. Paver Type #3: Vehicular 12"x12"x 3-1/8" thick
      d. Paver Type #4: Pedestrian 24"x36"x 2-3/4" thick
      e. Paver Type #5: Pedestrian 24"x24"x 2-3/4" thick
   2. Colors: Two paver colors will be selected by Landscape Architect.
   3. Materials:
      a. Comply with material standards set forth in ASTM C 936.
      b. Portland Cement: ASTM C-150 specifications for Portland Cement,
      c. Aggregates: All aggregates are tested in accordance with ASTM C127, ASTM C128, and ASTM C-136 specifications. Aggregate shall be blended to meet individual project requirements.
      d. Coloring: Pigments used shall be inorganic and alkali resistant and used per manufacturer's recommendations.
      e. Factory Applied Sealer: Colorless slip and stain resistant penetrating or acrylic sealer.

4. Performance:
   a. Compressive Strength: (ASTM C-140) The average compressive strength shall not be less than 8,000 psi with no individual unit less than 7,000 psi.
   b. Water Absorption: (ASTM C-140) The average shall not be greater than 6 percent.
   c. Flexural Strength: (ASTM C-293) Shall not be less than 800 psi.
   d. Center Load: (WTCL 99) Pressed paver units shall have a tested center load capacity of 1,850 lbs.
   e. Freeze/Thaw: (ASTM C-1262) Durability of the pressed paver shall meet the freeze/thaw tests per Section 8, shall have no breakage and not greater than 1 percent loss in dry weight of any individual unit when subject to 100 cycles of freeze/thaw.
   f. Static Coefficient of Friction: (ASTM C-1028):
   Wet: > 0.50 and Dry: > 0.60
   g. Sizing Dimensions: Shall not differ by more than 1/16 inch (1.6 mm) from width, height, length or thickness. Unit shall conform to a true plane and not differ by more than 1/16 inch (1.6 mm) in either concave and/or convex warpage.

2.2 BITUMEN SETTING BED MATERIALS

A. Asphalt Setting Bed Materials:
   1. Asphalt Cement: ASTM D 3381, viscosity grade AC 10 or AC 20.
   2. Fine Aggregate: Clean hard sand free of organic matter, uniformly graded from coarse to fine, all passing the No. 4 sieve meeting the gradation requirements when testing in accordance with ASTM C 136.
   3. Mixing: Provide plant mixed asphalt setting bed by combining dry fine aggregate (approximately 93 percent) and hot asphalt cement (approximately 7 percent) and heat to approximately 300 degrees Fahrenheit. Provide each ton of setting bed material apportioned by weight with the approximate ratio of 145 lbs. of asphalt to 1,855 lbs. of sand.

B. Setting Bed Primer: Cut back asphalt, ASTM D 2028, grade as recommended by the asphalt paving manufacturer.

C. Asphalt Adhesive: Standard neoprene modified asphalt adhesive containing oxidized asphalt combined with 2 percent neoprene and 10 percent long fibered mineral fibers with a softening point of 155 degrees Fahrenheit.

D. Joint Filler Materials: Sand conforming to ASTM C 144 with 100 percent passing a No. 16 sieve.

E. Pre-formed Asphalt Joint Filler: ASTM D 994, 1/2-inch thick for expansion joints.

2.3 CONCRETE BASE COURSE

A. Existing concrete base course may be utilized for a portion of the project. See plans for limits of existing and new concrete base course.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Acceptance of Site Verification of Conditions:
   1. General Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers:
      a. Verify that existing and new concrete base materials, thickness, surface tolerances and elevations conform to specified requirements.

b. Verify location of 2 in. diameter weep holes at 20 ft centers at lowest elevations against curbs, walls, or other permanent structures. Verify holes filled with washed pea gravel. Provide temporary plugs for holes to prevent ingress of sand-asphalt setting bed or neoprene adhesive during construction. Remove plugs when paving adjacent to drain holes.
c. Verify that concrete surfaces to receive the bitumen bedding material are free of dust, oil, grease, paint, wax, curing compounds, primer, sealers, form release agents, from cracks over 3/16 in. in width, or any deleterious substances and debris which may prevent or reduce bonding.
d. Conduct moisture tests to verify that concrete surfaces are cured, free from hydrostatic pressure and having a moisture content of less than 5%.
e. Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage inlets.
f. Do not proceed with installation of bedding sand and interlocking concrete pavers until base conditions are corrected by the General Contractor or designated subcontractor.

3.2 PREPARATION

A. Verify base is dry, certified by General Contractor as meeting material, installation and grade specifications.
B. Verify that base is clean, dry, and ready to accept tack coat, bitumen-setting bed, pavers, and imposed loads.

3.3 INSTALLATION

A. Concrete base preparation
   1. Fill any cracks under 3/16 in. wide with mortar.
   2. Sweep the surface clean.
B. Asphalt primer
   3. Apply at a rate of 0.9 to 1.3 gal per 100 ft². Once applied the tack coat should not be disturbed and should be allowed to cure or break before covering with the setting bed material.
C. Bituminous setting bed
   1. Place in panels between ¾ in. high screed rails spaced approximately 12 ft. Rake and screed smooth with strike board.
   2. Use screed rails to achieve a level setting bed conforming to elevations and slope shown on the drawings. After one panel is complete, advance screed rails to the next position in readiness for screeding adjacent panels with strike board. Fill depressions left from removed screed rails and smooth to height consistent with panel.
   4. Place an area in size that will remain at least 270° F during compaction.
   5. Compact the setting bed with a powered roller compactor to an even, nominal thickness of ¾ in. after compaction.
   6. Re-heat, fill, and compact low areas with setting bed materials to conform to slope and elevation shown on the drawings.
   7. Re-heat, remove, level, and compact setting bed in high areas to conform to slope and elevation shown on the drawings.
   8. Irregularities or evenness in the grade of the concrete base surface may be corrected with setting bed materials only with approval by the Landscape Architect.
D. Neoprene modified asphalt adhesive
   1. Apply to cold asphalt setting bed with a squeegee in a thickness not exceeding 1/16 in. Do not apply pavers to adhesive until dry skin forms on surface of adhesive.
E. Concrete pavers
   1. Free from dust, dirt, and stains. Do not use soiled, cracked, or broken units.
   2. Place paving units firmly onto adhesive with joints as recommended in manufacturer's literature. Maintain straight pattern lines, joint lines and coursing per the drawings.

3. Cut pavers to fit edges with a masonry saw. No cut paver shall be smaller than 1/3 of a whole unit if exposed to vehicular traffic. Firmly place all edge units on adhesive.

F. Joint filler and sealant
1. Extend control and structural joints through full depth of paving units. Do not extend joints through bituminous bedding materials from joints in concrete base that control shrinkage cracking.
2. Install joints at all building facades or other vertical surfaces.
3. Install pre-molded joint filler as units are set in bituminous bed. Maintain top of filler 3/8 in. below exposed faces of paving units for insertion of sealant.
4. Install joint sealant per manufacturer's recommendations.

G. Joint sand
1. After the pavers, joint filler, and sealant are installed, spread dry joint sand and fill joints between the slabs.
2. Sweep surface clean.

3.4 FIELD QUALITY CONTROL

A. Maximum of 1/16-inch (1.6 mm) height variation between adjacent pavers.
B. Individual pressed pavers shall not vary more than 1/16 inch from level across width of the pressed paver.
C. Paved areas shall not vary more than 1/4 inch in a distance of 10 feet measured at any location and in any direction.
D. The surface elevation of pavers shall be 1/8 inch to 1/4 inch above adjacent drainage inlets, concrete collars or channels.
E. Joints between pavers to be greater than 1/16 inch.

3.5 CLEANING AND PROTECTION

A. Remove and replace pressed pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units with same joint treatment to eliminate evidence of replacement.
B. Wash entire surface with phosphate free neutral cleaner, rinse with clean water and allow to dry thoroughly.
C. Apply sealer in accordance with manufacturer's directions.
1. Penetrating or topical type sealer designed especially for pressed concrete pavers.

3.6 PROTECTION

A. After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION 32 14 13

SECTION 33 10 00 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. DIP: Ductile iron pipe

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with standards and requirements of utility company supplying water. Include tapping of water mains, backflow prevention, materials, installation, testing, and disinfection.
2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

G. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Engineer/Architect no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Engineer's/ Architect's written permission.

B. No connection or alteration of existing Greenville Utilities Commission water or sewer mains or appurtenances are permitted without the express written consent of authorized GUC personnel. Operation of Greenville Utilities Commission valves, hydrants or other components is prohibited unless the Contractor has specific written approval for such action.

C. Connection of new items to the existing Greenville Utilities Commission system requires that any components added by the contractor be thoroughly disinfected prior to installation and use. Excavations must be kept dewatered whenever GUC water main facilities are cut, tapped, depressurized or otherwise open and vulnerable to contamination.

D. Of any GUC water system components are removed they shall be delivered to the GUC's Operations Center undamaged if requested to do so by Engineer.

1.8 COORDINATION

A. Coordinate connection to water main with Greenville Utilities Commission.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated. The minimum thickness Class of pipe shall be Class 50.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.2 PVC PIPE AND FITTINGS

A. 2 inch diameter:
1. Pipe: PVC, Class 200 SDR 21 conforming to ASTM D1784 and ASTM D2241 with "push-on" joints.
2. Fittings: Schedule 80 PVC with solvent weld joints and shall bear NSF seal.

B. 4 inches and larger diameter:
1. Pipe: PVC, C900 ; pressure rating 200 psi.
2. Fittings: Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern. Grip rings shall be used on all fittings.

3. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.3 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Darling
   b. Mueller Co.; Water Products Div.
   c. Clow
   d. Approved Equal

2. Nonrising-Stem, Resilient-Seated Gate Valves:

   a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

      1) Standard: AWWA C509.
      2) Minimum Pressure Rating: 200 psig.
      3) End Connections: Mechanical joint.
      4) Interior Coating: Complying with AWWA C550.

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ford Model FAST
   b. JCM Model 432
   c. Meuleer Model H304
   d. Romac Model SST
   e. Approved Equal

2. Description: Sleeve and valve compatible with drilling machine.

   a. Standard: MSS SP-60.
   b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
   c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter either Tyler 6855 or EJIW #8555 with 06800007 lid.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.5 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
    g. Watts Water Technologies
2. Standards: AWWA C511.
3. Device must meet Greenville Utilities Standards: Design Manual, Chapter 7 – Material Specifications for Water System Extensions.
4. The devise must meet the recommendations of the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California.
5. Operation: Continuous-pressure applications.
6. Maximum Pressure Loss: 12 psig (83 kPa) maximum, through middle 1/3 of flow range.
7. Size: Per Plans
8. Body:
    a. Bronze for NPS 2 (DN 50) and smaller;
    b. Cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 (DN 65) and larger.
9. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
10. Configuration: Designed for horizontal, straight through flow.
11. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

B. Backflow Preventer Test Kits:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Conbraco Industries, Inc.
    b. FEBCO; SPX Valves & Controls.
    c. Flomatic Corporation.
    d. Watts Water Technologies, Inc.
    e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.6 PROTECTIVE ENCLOSURES

A. Freeze-Protection Enclosures:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Aqua Shield.
b. BF Products, Inc.
c. DekoRRa Products.
d. Dunco Manufacturing, Inc.
e. G&C Enclosures.
f. Hot Box, Inc.
g. HydroCowl, Inc.
h. Watts Water Technologies, Inc.

2. Description: Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F (4 deg C) when external temperatures reach as low as minus 34 deg F (minus 36 deg C).

a. Standard: ASSE 1060.
b. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
c. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

1) Housing: Reinforced fiberglass construction.

a) Size: To meet manufacturer's recommendations and approved by Engineer.
b) Drain opening for units with drain connection.
c) Access doors with locking devices.
d) Insulation inside housing.
e) Anchoring devices for attaching housing to concrete base.

2) Electric heating cable or heater with self-limiting temperature control.

B. Enclosure Bases:

1. Description: 4-inch (100-mm) minimum thickness precast concrete, of dimensions required to extend at least 6 inches (150 mm) beyond edges of enclosure housings. Include openings for piping.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 3/4 to NPS 3 shall be the following:
1. PVC, Schedule 40 with socket fittings; and solvent-cemented joints.

F. Underground water-service piping NPS 4 to NPS 8 shall be the following:
1. Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint, restrained fittings; and mechanical joints.
2. PVC, C900 socket fittings; and solvent-cemented joints.

G. Aboveground Water-Service Piping NPS 3/4 to NPS 3 shall be the following:
1. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.

H. Underground Fire-Service-Main Piping NPS 4 to NPS 12 shall be the following:

1. Ductile-iron mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.
2. PVC, AWWA C900 Class 150 pipe listed for fire-protection service; PVC fabricated or molded fittings of same class as pipe; and gasketed joints.

I. Aboveground Fire-Service-Main Piping NPS 4 to NPS 12 shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

3.3 RELATION OF WATER MAINS TO STORM DRAINAGE

A. Crossing a Water Main over a Storm Sewer

1. Whenever it is necessary for a water main to cross over a storm drainage line, the water main shall be laid at such an elevation that the bottom of the water main is at least 12 inches above the top of the storm drainage line.
2. Where local conditions or barriers prevent a 12 inch vertical separation, the Contractor shall provide that the water main be constructed of Ductile Iron Pipe, of a class directed by the Engineer, with joints that are equivalent to water main standards for a distance of ten (10) feet on each side of the point of crossing.

B. Crossing a Water Main Under a Storm Drainage Line

1. Whenever it is necessary for a water main to cross under a storm drainage line, the Contractor shall provide for the water main to be constructed of Ductile Iron Pipe, of a thickness class 50, with joints equivalent to water main standards for a distance of ten (10) feet on each side of the point of crossing.
2. A section of water main pipe shall be centered at the point of crossing.
3. At the direction of the GUC Engineer, the Contractor shall pour a concrete pad under the storm pipe to inhibit future settlement.

3.4 RELATION OF WATER MAINS TO SANITARY SEWERS

A. Lateral Separation of Sewer and Water Mains: Water mains shall be least at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10-foot lateral separation in which case:

1. The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

2. The Water main is laid in the same trench as the sewer with the water main located at one side of a bench of undisturbed earth, and with the elevation of the bottom of the water mains at least 18 inches above the top of the sewer.

B. Crossing a Water Main Over a Sewer: Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom f the water main is at least 18 inches above the top of the sewer, unless local condition or barriers prevent an 18 inch vertical separation – in which case both the water and the sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.

C. Crossing a Water Main Under a Sewer; Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. A section of the water main pipe shall be centered at the point of crossing.

3.5 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
2. Use the following for valves in vaults and aboveground:

    a. Gate Valves, NPS 2 and Smaller: Bronze, rising stem.
    b. Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.
    c. Check Valves: AWWA C508 swing type.

3.6 PIPING INSTALLATION

A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated. Contractor shall notify Greenville Utilities Commission and the Engineer 48 hours prior to making tap to coordinate inspection.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Pressure test tapping sleeve assembly prior to cutting hole.
2. Install tapping sleeve and tapping valve according to MSS SP-60.
3. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
4. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
5. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

D. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.

E. Deviation from the proposed line and grade shown on the approved plans is not permitted without prior approval by the Engineer.

F. Longitudinal deflection of PVC pipe shall not exceed the pipe manufacturer and Uni-Bell recommendations for the type of pipe installed. Longitudinal deflection of ductile iron pipe shall not exceed the requirements of AWWA C 600.

G. When multiple forms of pipe restraint are utilized each method must be capable of resisting the full thrust force.

H. Bury piping with depth of cover over top at least 36 inches.

I. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

J. Extend water-service piping and connect to water-supply source and building-water-piping systems at 5 feet from outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping 5 feet from outside of building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

K. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

L. See Division 13 Section "Fire-Suppression Piping" for fire-suppression-water piping inside the building.

M. See Division 15 Section "Domestic Water Piping" for potable-water piping inside the building.

3.7 JOINT CONSTRUCTION

A. Make pipe joints according to the following:
1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Piped Utilities - Basic Materials and Methods" for joining piping of dissimilar metals.

3.8 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Restrained-joint types used include the following:

1. Use on ductile iron and C-900 PVC “push on” joints.
2. Use on mechanical joint to C-900 PVC.
3. Use on mechanical joint ductile iron.
4. Lock hydrant tees and fittings for fire hydrants.
5. Bolted Couplings for PVC C-900 pipe and ductile iron pipe.

B. Restraint devices for use on ductile iron and C-900 PVC “push-on” joints shall be constructed of high strength ductile iron, ASTM A536, Grade 65-45-12 and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe n an even and uniform manner. Bolts and connecting hardware shall be of high strength, low allow material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Block Buster Series 1390-C, Star Pipe Products Allgrip series 3600 and Pipe Restrainers Series 1200S, or approved equal.

C. Restraint devices for use on mechanical joint to C-900 PVC, shall be constructed of high strength ductile iron, conforming to the requirements of ASTM A536, Grade 65-45-12, and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe in an even and uniform manner. Bolts and connecting hardware shall be of high strength low alloy material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Series 1500, Star Pipe Products, Allgrip Series 3600, Romac Industries, Inc GripRing or approved equal.

D. Restraint devices for use on mechanical joint ductile iron, shall be constructed of high strength ductile iron, conforming to the requirements of ASTM A536, Grade 65-45-12, and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe in an even and uniform manner. Bolts and connecting hardware shall be of high strength low alloy material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Series 1300 C, Star Pipe Products, Allgrip Series 3600, Romac Industries, Inc. GripRing or approved equal.

E. Locked hydrant tees and fittings for fire hydrants shall meet the requirements of AWWA Standard C-111 (ANSI A21-11). Locked tees shall be as manufactured by American Cast Iron Pipe Company, Clow, U.S. Pipe, or approved equal.

F. Bolted Couplings for PVC C-900 pipe and ductile iron pipe shall be constructed of a center sleeve and end rings of ductile iron in accordance with ASTM A536. Bolts and nuts shall be of high strength, low alloy steel per ASTM A242 and AWWA C-111. Center sleeve and end rings shall have a paint finish coat. Couplings shall be Ford Style FC1, Romac 501 Series, Smith Blair 441, or JCM 201.

3.9 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

3.10 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.11 PROTECTIVE ENCLOSURE INSTALLATION

A. Install concrete base level and with top approximately 2 inches (50 mm) above grade.

B. Install protective enclosure over valves and equipment.

C. Anchor protective enclosure to concrete base.

3.12 CONNECTIONS

A. Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems.

B. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Connect water-distribution piping to utility water main. Use tapping sleeve and tapping valve.

D. Pipe cutting, where permitted by the Engineer, shall be done in accordance with the written recommendations of the pipe manufacturer.

E. Connect water-distribution piping to interior domestic water and fire-suppression piping.

F. Ground equipment according to Division 16 Section "Grounding and Bonding."

G. Connect wiring according to Division 16 Section "Conductors and Cables."

3.14 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure but not less than 150 psi for two hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test

pressure and hold for 1 more hour. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.15 **IDENTIFICATION**

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 2 Section "Earthwork."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for identifying devices.

3.16 **TESTING**

A. The Contractor will be required to furnish, set up, and service a suitable pump and test equipment (to accurately measure water pressure). The Contractor shall contact Deep Run Water Corporation and the Engineer 48 hours prior to performing test for coordination of inspection.

B. The Contractor shall test each section between valves of the pipe line to a hydrostatic pressure of one hundred fifty (150) pounds per square inch, making sure that there is no air in the pipe, valves and hydrants. This can be done with corporation cocks being placed at the high spots in the line.

C. Where water is not readily available the Contractor shall provide a sterilized tank of such capacity to provide sufficient water for the test.

D. The Contractor shall perform the test for a period of time not less than two (2) hours or for a period considered necessary by the Engineer to insure tightness of the joints and to detect any defective material. Lines shall maintain 150 pounds per square inch after a time period of two hours.

C. The allowable leakage shall be as specified under each section of applicable pipe used. The leakage of the test section shall be accurately determined and compared to the schedule shown below:

PIPE SIZE (inches)	**ALLOWABLE LEAKAGE** (Gallons per hour per 1000 feet of pipe)
2	0.16
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
16	1.47

D. If any portion of the pipe line proves to be defective, the Contractor shall correct the defect and re-test the line for compliance. Such action shall be maintained until the line complies to the leakage requirements.

3.17 **CLEANING**

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 for a continuous feed method or do as follows:

    a. Fill system through dispersion of a chlorine solution in concentrations sufficient to produce a chlorine residual of at least 50 milligrams per liter (or ppm) in the water throughout the distribution system.
    b. The chlorine solution shall remain in contact with interior surfaces of the water system for a period of 24 hours.
    c. The water system shall be flushed with fresh water form an approved water source until the chlorine solution is dispelled
    d. Submit water samples in sterile bottles to authorities having jurisdiction for analysis by a state-approved laboratory. Repeat procedure if biological examination shows evidence of contamination. The Greenville Utilities representative shall be present when samples are taken. The number of samples shall be as required by Greenville Utilities but not less than 2 shall be taken.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 33 10 00

SECTION 33 40 00 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, apply to this Section.

1.2 SUMMARY

B. This Section includes gravity-flow, non-pressure storm drainage outside the building, with the following components:

1. Special fittings for expansion and deflection.
2. Cleanouts.
3. Drains.
4. Corrosion-protection piping encasement.
5. Catch Basins, Drop Inlets and Junction Boxes.
6. Grate and Frame for Cast-In-Place Trench Drains

1.3 DEFINITIONS

A. RCP: Reinforced concrete pipe.

B. PVC: Polyvinyl chloride

C. NCDOT: North Carolina Department of Transportation

D. NPS: Nominal Pipe Size in inches

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating. Pipe joints shall be at least silt-tight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Special pipe fittings.
2. Drains.
3. Piping.

B. Shop Drawings: For the following:

1. Drop Inlets and Junction Boxes: Include plans, elevations, sections, details, and frames and covers.
2. Catch Basins and Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
3. Slot Drains. Include plans, elevations, sections, details, and modular units, covers, and slot drain.
4. Frame and Grate for Trench Drains.

C. Coordination Drawings:
1. Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping.
2. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
3. Provide a sketch showing the relationship of the slot drain, trench drain, piping serving the drain and the pavers and underlayment to verify that the slot drain works with the selected hardscape paver.

D. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle catch basins and drop inlets, junction boxes according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Engineer no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Engineer's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with bell-and-spigot sealant joints with ASTM C 990, bitumen or butyl-rubber sealant.

B. PVC Piping and Fittings:

1. Pipe: ASTM D 1785, Schedule 40 PVC, with plain ends for solvent-cemented joints or for bell-and-spigot joints meeting ASTM D2672.
2. Fittings: ASTM D 2466, Schedule 40 PVC, socket type.

C. Ductile Iron Pipe and Fittings (Contractor's Option or where called out on plans):

1. Pipe: Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

D. Perforated PE Pipe and Fittings:
1. NPS 6 (DN 150) and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 (DN 200) and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. Couplings: Manufacturer's standard, band type.

2.4 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.5 CATCH BASINS, JUNCTION BOXES, SLOT DRAINS, AND DROP INLETS

A. Standard Precast Concrete Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
2. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
3. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
5. Grade Rings: Include 2 or 3 reinforced-concrete risers, of 6- to 9-inch total thickness, that match frame and grate.
6. Steps: Individual FRP steps, FRP ladder, or ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.

1. Joint Sealants: ASTM C 990, bitumen or butyl rubber.
2. Grade Rings: Include 2 or 3 reinforced-concrete risers, of 6- to 9-inch total thickness, that match frame and grate.
3. Steps: Individual FRP steps or FRP ladder, Individual FRP steps, FRP ladder, or ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP,ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
4. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum, unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

D. Finished Catch Basins as a minimum shall conform to Section 840 of NCDOT's Standard Specifications for Roads and Structures and shall be soil-tight.

E. Trench Drain Grates and Frames for Cast-in-Place Trench Drains: Grates and frames shall be constructed of ductile or cast iron and shall be a minimum of Class A for pedestrian traffic. The grate opening arrangement shall be ADA heal compliant. Grates shall be supplied with a companion matching grate frame to be site cast in with the concrete per the detail on the plans. Common, compatible and single manufacturing of components includes the frame, the grate, tamper-proof attachment clips or other method meeting the following requirements:

1. Meet the requirements shown on the plans and details. Nominal Grate width is 5 inches.
2. The grate frame shall be equipped with nelson studs to be incorporated into the concrete trench pour.

3. Provide alternative decorative designs for the grate in the submittals for selection by the landscape architect. Landscape Architect intends to use the pattern and style shown on Plan Sheet GC-501, detail A1 or nearest feasible design.
4. Iron shall be ASTM A47, Class 250, or Ductile Iron ASTM A536, Grade 60-40-18.
5. Provide a Load Class A safe loading or better.
6. Be ADA compliant and heel compliant.
7. All below grade pipe connections must be sealed sufficient for silt-tight construction.
8. Grate to be tamper-proof and removable for cleaning without tools.
9. Meet the requirements given in the execution section of this specification.
10. Grate and Frame must be compatible with the pavers selected for the hardscape served trench drain.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section "Earthwork."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Gravity-Flow, Non-pressure Piping: Use any of the following pipe materials for each size range:

1. NPS 12 to NPS 36 : Reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints. Do not use nonreinforced pipe instead of reinforced concrete pipe.

2. NPS 10 and smaller pipe shall be Schedule 40 PVC as specified in “Pipe and Fittings” above.

3. In certain low cover conditions ductile iron pipe is specified. Ductile Iron pipe shall be as specified in “Pipe and Fittings” above.

C. Large piping (>NPS 36) for stormwater management systems such as underground detention, infiltration, and rainwater harvesting shall be aluminum pipe and fittings meeting ASTM B 745/B 745M, Type I with fittings of similar form and construction as pipe.

D. Piping for foundation and footing drainage shall be polyethylene (PE) perforated pipe as specified in “Pipe and Fittings” above.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves,

and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. All non-metallic pipe shall have a tracer wire installed along the length of the pipe.

C. Install inlets for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install gravity-flow, non-pressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install piping per plans.
3. Install piping below frost line.
4. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
5. Install PVC water-service piping according to ASTM D 2321 and ASTM F 1668.

3.4 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Section "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, non-pressure drainage piping according to the following:
1. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
2. Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.5 CATCH BASIN, JUNCTION BOX, SLOT DRAIN, AND DROP INLET INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

C. All pipe penetration holes shall be shown on the catch basin submittals and formed or cored at the precast manufacturer facility prior to shipment. There shall be no field cutting or knockout sections utilized.

D. All structures, including the sealing of pipe penetrations and the placement of the structures shall conform to NCDOT’s Standard Specifications for Roads and Structures Section 840.

E. Masonry work associated with the closure of pipe penetrations shall conform to the NCDOT Standard Specifications referenced above.

F. In reference to the slot drains, provide a manufactured factory solution for all pipe connections including a junction box of the same manufacture as the modular trench drain unit. All connections are to be silt-tight. Installation shall be in all respects as required by the manufacturer. Manufacturer’s directions shall be in the project submittals and in possession of field crews at all times when installing the trench drain.

3.6 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.7 PAINTING

A. Prepare ferrous frame and cover surfaces according to SSPC-PA 1 and paint according to SSPC-PA 1 and SSPC-Paint 16. Do not paint surfaces with foundry-applied, corrosion-resistant coating.

3.8 IDENTIFICATION

A. Materials and their installation are specified in Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Exception: Piping with soil-tight joints unless required by authorities having jurisdiction.

b. Option: Test concrete piping according to ASTM C 924.

C. Leaks constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 33 40 00

SECTION 35 51 14 – ALUMINUM FLOATING DOCK SYSTEM FOR TRANSIENT FACILITY

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The work includes the design, fabrication, and installation of an aluminum framed floating dock system, complete and ready to use, and all other items relating to the aluminum floating dock system as required for the **Greenville Town Common & Esplanade Project** project at the City of Greenville (City) Town Common. The work includes but is not limited to the polyethylene encapsulated floatation modules, aluminum framework, decking, anchorage system, connecting hardware, accessories, and gangways. Accessories must include all items on or within the docks that are not considered a structural component of the dock system, including but not limited to cleats, fenders, bumpers, rub boards/rails, rub strips, safety ladders, signage, safety systems, wear plates, and hinge plates. The dock system must consist of aluminum framed floats supported by polyurethane encapsulated flotation modulus connected to form continuous sections of a floating dock system. The Manufacturer must design the floating dock system to meet all requirements of the drawings and this specification. The Contractor shall furnish all materials, labor, equipment, utilities, and incidental items necessary per the project drawings and specified herein.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The most recent edition of this publication, including any revisions, must be used.

B. Aluminum Association (AA)

AA ADM	(2020) Aluminum Design Manual

C. American Nation Standards Institute (ANSI)

ANSI B18.22.1	(2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

D. American Society of Mechanical Engineers (ASME)

ASME B18.21.1	(2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

E. American Welding Society (AWS)

AWS D1.2/D1.2M	(2014; Errata 1 2014; Errata 2 2020) Structural Welding Code - Aluminum

F. American Society for Testing and Materials (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A276/A276M	(2023) Standard Specification for Stainless Steel Bars and Shapes
ASTM B209	(2021a) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B211/B211M	(2019) Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B308/B308M	(2020) Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM B429/B429M	(2020) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM B574	(2018) Standard Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Molybdenum-Chromium, Low-Carbon Nickel- Molybdenum-Chromium-Tantalum, Low-Carbon Nickel- Chromium-Molybdenum-Copper, and Low-Carbon Nickel- Chromium-Molybdenum-Tungsten Alloy Rod
ASTM C272/C272M	(2022) Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
ASTM C578	(2022) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM D143	(2022) Standard Test Methods for Small Clear Specimens of Timber
ASTM D792	(2020) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D1037	(2012; R 2020) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM D1435	(2020) Standard Practice for Outdoor Weathering of Plastics
ASTM D1621	(2016; R 2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics

ASTM D2241	(2020) Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D4020	(2018) Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
ASTM D6109	(2019) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products
ASTM D7031	(2011; R 2019) Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products
ASTM D7032	(2021) Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails
ASTM F593	(2022) Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594	(2022) Standard Specification for Stainless Steel Nuts

G. Naval Publications and Form Center (NPFC)

QPL-TT-P-664	(1994, Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

H. Society of Automotive Engineers International (SAE)

SAE AMS-QC-A-200/8	(2015) Aluminum Alloy 6061, Bar, Rod, Shapes, Tube, and Wire, Extruded

I. U.S. Department of Defense (DOD)

MIL-I-24768/14	(1992; Notice 1 2020) Insulation, Plastic, Laminated, Thermosetting, Cotton-Fabric-Base, Phenolic-Resin (FBG)

J. U.S. General Services Administration (GSA)

CID A-A-55619	(Rev C; Notice 1) Casters, Industrial, Heavy Duty

1.3 DEFINITIONS

A. "Anchorage System" is the dock restraint system such as guide piling, ground anchor system, strut-to-shore system, etc. including connections.

B. "Contractor" is responsible for the design, manufacturing, and installation of a complete floating dock system.

C. "Dock Accessories" are elements not considered part of the float system and include but are not limited to fenders, dock boxes, electrical and mechanical equipment, security features, and means of securing mooring lines.

D. “Extreme Event” is an extreme storm event that occurs with non-routine functionality such as a heavy rainfall event and/or tropical storm and hurricanes.

E. "Float System" is a system of floating dock modules structurally connected to transfer loads to the anchorage system. The float system includes the connection hardware and structural weldments to shore.

F. "Gangway" is an articulating ramp providing a connection from land to a floating dock.

G. "Main Pier" is the primary access float system extending perpendicular or at an angle from marginal/main walkway or shoreline for passage between the shore and boat slips, providing access to shore.

H. "Manufacturer" is the party responsible for the design and fabrication of the floating dock system, including connection to the anchorage system and gangway system. The dock Manufacturer is responsible for the design of the anchorage system.

I. "Marginal Walkway" or "Main Walkway" is the principal collector float system of branching main piers that is connected to shore.

J. "Non-Operational" is a case with nonroutine functionality and inactive use such as an extreme event where the dock is not in active use. Non-operational/ extreme event cases may be either occupied or unoccupied conditions.

K. “Occupied” is a case where boats are occupying the boat slips in the small craft harbor.

L. "Operational" is an occupied case with routine functionality and active use.

M. "Service life" is the Engineer's stated expectation for the number of years that the structure will function without needing major rehabilitation or replacement.

N. “Unoccupied” is a non-occupancy case where boats have been removed from the small craft harbor.

1.4 SUBMITTALS

A. The Contractor shall submit the following in accordance with the Contract Documents. Note that approval of the submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

B. Preconstruction Submittals

1. Quality Control Procedures
2. Contractor Qualifications
3. Manufacturer Qualifications

C. Shop Drawings

1. Floating Dock System
2. Gangways

D. Product Data

1. Metal Accessories
2. Plastic Lumber
3. Cleats
4. Ladders
5. Gangway Materials

E. Design Data

1. Floating Dock System Design Calculations
2. Gangway Calculations

F. Test Reports

1. Composite Decking
2. Fasteners
3. Foam Core
4. Metal Accessories
5. Water Absorption
6. Aluminum Alloy
7. Polyethylene Float Modules

8. Structural Steel

9. Welder Qualifications

G. Operation and Maintenance Data

1. Floating Dock System Operation and Maintenance Manual

H. Closeout Submittals

1. As-built Drawings

2. Warranty

3. Float Records

1.5 QUALITY CONTROL

A. Prior to ordering the dock system, submit quality control procedures to be used during the design, manufacturing, and installation of the floating dock system.

1.6 QUALIFICATIONS

A. Submit experience data verifying required years of experience in the manufacturing and installation of aluminum floating dock systems with reference projects of similar size and scope. For each reference project, provide project name, location, date of installation, and Owner including the name, address, phone number of a person who can be contacted for verification.

1.7 MANUFACTURER QUALIFICATIONS

A. Aluminum floating dock system must be the product of a Manufacturer specializing in the production of aluminum floats with a minimum of 10 years' experience in the manufacturing of aluminum floating dock systems. The float system design must have been successfully installed for a minimum of 5 years at another location with comparable environmental exposure.

1.8 FACTORY INSPECTION

A. At the option of the City, floats may be inspected by the QC Representative prior to being transported to the job site. The Manufacturer must give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the City's right to enforce contractual provisions after units are transported or erected.

1.9 PRODUCT RECORDS

A. Submit a complete and accurate record of all floats manufactured for the project. The record must include assigned float identification number, date cast, related concrete cylinder strength tests, and all quality assurance tests and inspection items performed on the float.

1.10 PRODUCT TESTING

A. Submit a complete and accurate record of test procedures, methodology, equipment, and results for each test specified.

1.11 PRODUCT QUALITY CONTROL

A. Tests and inspections must be performed by the Manufacturer using qualified individuals, engineering companies, or testing laboratories that must perform those special inspections specified herein and such other tests and inspections as the City may require to establish the acceptability of the work.

B. Manufacturing plant must be ISO 9001 certified or an approved equivalent third party verified quality control program for the manufacturing of aluminum floats and polyethylene float modules. The Manufacturer must provide documentation of the ongoing quality control program covering floating dock manufacturing. Weld quality control must be an AWS certified program with welder qualifications; qualify welders using procedures, materials, and equipment of the type required for the work. The City and Engineer, prior to start of floating dock fabrication, must review and approve the proposed quality assurance program and welder's AWS certifications.

C. If a non-conformance is encountered, the dock manufacturer must notify the City immediately and recommend a change in materials or procedure to resolve the non-conformance to the satisfaction of the City.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Storage Requirements: Store aluminum floats off the ground on support points indicated on the shop drawings. Separate stacked aluminum floats by battens across the full width of each bearing point. Protect from weather, marring, damage, and overload. Deliver the materials to the project site and store in a safe area out of way of traffic and shored up off the ground surface. Use extreme care in the loading, unloading, and transporting materials to prevent damage.

B. Identification: Place identification numbers on all floats (such they are not covered up after assembly) that conform to the shop drawing numbering system. Identify hardware, framework, and accessories, and store separately from each other. Protect all metal products with adequate weatherproof outer wrappings.

C. Repairs: In the event of damage during transportation, storage, or installation, the Contractor must make repairs and/or replacements as necessary to the satisfaction of the City at no additional contract cost.

1.13 QUALITY ASSURANCE

A. Shop Drawings: Submit floating dock system shop drawings indicating complete information for the fabrication, handling, and erection of the floating dock system. The shop drawings must indicate the proposed float layout and slip size, float dimensions, float construction details, connection details, anchorage, and location and methods for attaching dock accessories. Submit shop drawings for all specially fabricated items including weldments and hardware, gangways, railing, curbing, and cleat installation. Drawings must not be reproductions of contract drawings. Shop drawings must be prepared and sealed by a registered Professional Engineer registered in the State of North Carolina and submitted for approval prior to fabrication. The drawings must indicate, as a minimum, the following information:

1. Floating dock system layout and dimensions
2. Markings of floats for assembly
3. Connections between floats, and connections between floats and other construction
4. Location and anchorage of mooring fittings
5. Material properties of all materials used
6. Lifting and assembly of float inserts and embedded items
7. Erection sequence and handling requirements
8. All loads used in design (such as live, dead, wind, current, berthing, handling, and erection)
9. Bracing/shoring methods of temporary support
10. Gangways, gangway wheel load distribution, and connections
11. Anchorage system layout with size, type, length, and location of each component

B. Design Calculations: Submit final floating dock system design calculations demonstrating the dock system conforms to the minimum requirements outlined in this specification. Design calculations (including but not limited to connections, anchorage, and gangways) must be prepared and sealed by a registered Professional Engineer, registered in the State of North Carolina and submitted for approval prior to fabrication. The calculations for the dock system include but are not limited to:

1. Overall system loads under full occupancy, with consideration for shielding factors, and deflection of the system and its effects on the anchorage system

2. Anchorage system capacity for individual and overall load considerations

3. Capacity of embedded items used to resist stresses encountered during casting, transporting, handling and erection

4. Anchorage system overall dimensions, elevations, cross sections, minimum embedment, and minimum test loads

5. Determination of extreme fiber stresses in structural members for all load cases

6. Stresses in the dock system connections for all load cases

7. Transfer of moored vessel forces to the dock system

8. Transfer of forces to dock anchorage system and float attachment points to ensure reactions are appropriately and rationally distributed throughout the system

9. Freeboard calculations for all floats

10. Transfer of dock loads to another structure or to soil through anchorage system, including analysis of soil structure interaction

11. Gangway calculations for all load cases

C. Manufactured Items: Submit catalog cut sheets for all standard manufactured items that are to be incorporated into the floating system. All materials must be suitable for sustained use in the marine environment for the design life of the structure.

D. Warranty: Furnish the Manufacturer's warranty. The warranty must be issued to the City and not be limited in dollar value. The aluminum framed dock floats must carry a warranty against defects in materials and workmanship for a period of five (5) years from the date of project acceptance. All other dock system components including structural members and accessory items must carry a Manufacturer's warranty against defects in materials and workmanship for a minimum of one (1) year from the date of City acceptance of the work. If, within the respective warranty periods, any materials or their installation are found to be defective, the Manufacturer must repair or replace the defective item at no cost and to the satisfaction of the City. The warranty excludes coverage for damage caused by abuse, misuse or neglect, and improper maintenance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design Life: The floating dock system, including all structural components of the systems, must be designed for a minimum thirty (30) year life expectancy.

B. Dock System Performance:

Floating dock system, including all structural components of the system, must be designed to withstand operational load conditions without damage. Manufacturer must consider that dock system will be occupied and in use during all operational conditions.

Floating dock system must be designed to survive both the occupied and the unoccupied nonoperational (Extreme Event) conditions intact and in place such that the structure cannot breakaway or disconnect from the anchorage system or adjacent floats. Dock system must be designed such that major structural connections maintain their structural integrity but does not preclude repair or replacement of individual components.

Dock system design must consider fatigue of all structural components over the design life of the dock system, including connections for deck mounted appurtenances.

C. Dock System Layout: The layout and principal dimensions of the floating dock system are indicated on the drawings. The Manufacturer must provide a system that conforms to the layout and dimensions indicated on the drawings and the provisions of this specification. Minor variances in dock dimensions to accommodate Manufacturer's standard products are acceptable to the layout and dimensions indicated on the drawings. All variances must be submitted by the Contractor to the Engineer for approval prior to fabrication.

D. Dock System Design: The Manufacturer is responsible for the design of a complete floating dock system, including anchorage system. The Float system must consist of aluminum framing with polyethylene float modules fully encasing a polystyrene foam core. Float modules must be connected to form continuous sections of floating dock by bolted connections capable of transmitting all loads imposed upon individual dock floats, or combinations of dock floats, to the floating dock anchorage system. The connection system must be easily assembled and allow for the removal of one or more of the floats while keeping the remaining floats in place.

E. Aluminum Float Design: Aluminum frame system must be designed in accordance with AA ADM.

F. Float Width: Aluminum floats must be sized so that a single float is used to attain the indicated dock width. The use of more than one float connected side by side to attain dock width is unacceptable.

G. Deck Freeboard: Deck freeboard under dead load only at the time of dock system acceptance must be 20 inches unless otherwise shown on the drawings, with a tolerance of +/- 1 inch. Freeboard under combined dead load plus uniform live load must not be less than 12 inches.

H. Deck Tolerances: The floating dock system must be designed to float level under dead load and within the specified tolerances for live loads and environmental loads. The deck of the floats must be level and flush upon completion within the following tolerances:

1. Dead load deck surface slope: Transverse direction not more than 1/8 inch per foot. Longitudinal direction not more than 1 inch per 10 feet of length and cumulatively maintain deck within specified freeboard limits.

2. Assembly gap between adjoining floats: Minimum 1/4 inch. Maximum 1/2 inch without gap plate. Assembly gaps exceeding maximum gap width must be covered with an anti-skid gap plate in accordance with ADA guidelines and OSHA.

3. Vertical height difference between adjoining floats, walers, rub trips, and deck panels: Maximum 1/4 inch on ADA Accessible Routes or 3/8 inch all others.

4. No more than 4 inches differential horizontal movement between adjacent structures or dock segments under design loading and environmental conditions.

5. Cross slope with the concentrated live load placed anywhere on the float must not exceed 2 percent or 3-inch differential freeboard across the float, whichever is less.

I. Specialized Floats: Specialized floats must be designed to support the superimposed dead loads imposed by gangways, ramps, utilities, and other dock accessories. Floats with superimposed loads must have the same freeboard as floats without such loads, so that there will be no residual stresses when the floats are interconnected and to ensure that the dock system deck is level within the specified tolerances.

J. Dock Anchorage System: The anchorage system for the floating dock must be designed to accommodate all applicable load cases, movement tolerances, and the full range of design water elevations depicted on the drawings.

1. Water Levels: Floating dock system is located in a riverine condition that is subject to daily and extreme changes due to storms in the watershed that result in rapid changes in the Tar River. The anchorage system design must consider water level ranges for both the operational condition and extreme water level fluctuations during nonoperational conditions. Anchorage system must also plan for an extreme water elevation of +22.0 feet NAVD and 1.0 foot of wave generated by wind or boat wake.

2. Geotechnical Data: A geotechnical report that contains relevant soils information for design is available for review at the office of the City.

3. Anchoring System:

Strut to shore (stiff arm) system is a concrete filled steel pipe pile supporting a horizontal steel pipe stiff arm that is connected via steel pin and plate to the floating

dock in accordance with Section 31 62 16 Steel Pipe Piles and Section 05 50 13 Miscellaneous Metal Fabrication

The steel pin and plate connection to the floating dock must be designed to permit removal of a dock float from the stiff arm by simple bolt removal for repair or replacement purposes.

The Manufacturer must determine the section, length, tip elevation and location of the anchor pile and stiff arm required for the proposed dock system in order to optimize the overall dock design.

Pile design criteria include the pile cutoff elevation, design soil parameters, the design water levels that determine the elevation of the applied dock load, and the local water depth. Non-operational lateral load must be applied to the stiff arm system at the extreme water elevations plus dock freeboard. Lateral load for operational load cases must be applied at the highest operational water level and dock freeboard.

K. Gangway Design: The drawings depict a general layout and configuration of the gangway systems as well as required dimensions. Complete dimensions will be required by the fabricators. Gangways are subject to the same load conditions identified in the paragraph titled "DOCK LOADING". Manufacturer must submit final design calculations for the gangway systems demonstrating that the gangways are designed to withstand the required loading for operational and non-operational conditions throughout the specified design life.

L. Gangway Design Requirements

1. Gangway must be aluminum fabrications. Coordinate the gangway systems design with the floating dock system design. Provide sufficient floatation to support the superimposed load of the gangway plus any appurtenances to maintain required freeboard. The gangway wheel assembly must not land within 1 ft of the edge of the aluminum float at any water level.

2. The deck and structural components must be designed with a minimum safety factor on working stress as specified in AA ADM for bridge type structures. For non-aluminum structural components, similar safety factors apply.

3. Gangway design must consider stresses resulting from handling and installation, and provide notations on how to lift, unload, and set gangway in place.

4. Maximum allowable deflection under vertical live load must not exceed L/240 where L is the gangway span length.

5. The gangway system must conform in all respects to design requirements of ADA and OSHA rules for marinas and local codes as applicable, including length, slope, walking surface, and railing. The gangway system must have a guardrail on each side of the

walking surface (not including the transition plate), designed in accordance with ADA and OSHA requirements. The rails must be fabricated of aluminum pipe or tubing.

6. Walking surface must be aluminum decking, non-skid and resistant to staining by spills and dirt. The static Coefficient of Friction (COF) must be 0.5 for walking surfaces. However, slip resistance varies from surface to surface, therefore any accessible floor must have a COF in accordance with OSHA and ANSI recommendations and should be in compliance with ADA guidelines.

7. Gangway dock end connections must be designed to withstand float motions including vertical change in elevation due to water level fluctuation and horizontal movement without structure interference or overstress, including fatigue of gangway members, anchorage, and supports.

8. Gangways must be fitted with hinged transition plates at float end to assure a safe uniform transition between gangway and deck surfaces. The gangway transition plate must make a smooth, gap-free transition between the gangway walking surface and the float. Each plate must be a minimum 1/4 inch thick aluminum plate with a non-skid surface and must be attached to the gangway by means of a continuous pipe hinge. The plate must be the full width of the gangway and have an ADA compliant slope. Transition plates must be designed so as to not damage or mar the floating dock surface.

9. Wheels must be installed at the float end of the gangway. Wheels must accommodate both lateral and longitudinal movement. The wheels must have an allowable load rating greater than that required by the design loads. The gangway design must allow the wheels to be supported by the floating dock at all times regardless of float motions. A load transfer plate must be added to the surface of the float and include wheel guides parallel to the gangway. Where float end may rise above shore connection, provide a second set of wheels and reinforce dock edges with a slide plate to support the gangway at extreme water elevations.

10. The gangway hinge at the shore connection must be designed to permit rotation of the gangway in both the vertical direction due to water level fluctuations and the horizontal direction due to lateral loads on the float and must accommodate float motions for all environmental conditions and boat waves from passing vessels.

11. Contact between aluminum and dissimilar metals must be avoided, except for the use of compatible stainless steel pins. Where potential for galvanic corrosion exists, the aluminum must be isolated from direct contact with other metals or concrete by use of suitable non-conducting insulators or bushings.

2.2 DOCK LOADING

A. Floating dock system must be designed for side tie berthing of 26-foot-long vessels for the following load and geometric conditions as a minimum. Load cases must be combined

based upon their probability of simultaneous occurrence and in accordance with applicable codes and standards. Calculations must be performed for wind, current, and wave loads both parallel and perpendicular to the dock and dock anchorage system with consideration for differential movement between adjacent dock segments. Dock system must be stable and meet tolerances specified herein during both operational and nonoperation conditions.

B. Dead Load: Dead load, including all work of other trades, must consist of the weight of floats, aluminum framing, and all other permanently attached accessories such cleats, bumpers, etc. Manufacturer must exercise care to be sure that all dead loads are accurately determined and accounted for, including superimposed gangway system loads, consideration of weight gain due to water absorption, marine growth, and manufacturing tolerances that affect the final freeboard.

C. Vertical Live Load

1. Uniform Live Load of 40 psf on dock, including the area of landings and gangways supported by the dock.

2. Concentrated Live Load of 400 lbs applied at a location on the dock or gangway at least 12 inches from the edge. For side tie slips, design slip width is 125 percent per vessel length.

D. Wind Load: Horizontal load acting on the projected side and end areas of vessels and docks.

1. Operational wind speed of 40 mph (3-second gust) for occupied conditions (with vessels in place).

2. Non-operational wind speed of 129 mph (3-second gust) as required by local building code for unoccupied conditions (without vessels in place).

3. Vessel Profile Area

a. Vessel Profile Beam = . For side tie slips, design slip width is 125 percent per vessel length.

b. Vessel Profile Height = 15 percent x length of vessel.

4. Wind Load Application

a. Assume 100 percent berth occupancy for occupied condition.

b. Transverse load on vessel applied at 1/3 and 2/3 points to pier finger.

c. Longitudinal load on vessel applied at vessel centerline to the main walkway.

E. Current Load

1. Operational current load of 0.5 fps for occupied condition.

2. Non-operational current load of 2.0 fps for unoccupied conditions.

F. Wave Load

1. Vertical wave load as determined from the following conditions:

a. Operational and Non-operational wave load with significant wave height (Hs) of 1.0 feet and peak wave period (Tp) of 2.0 seconds. Wavelength equal to 30 feet, or the length of dock, whichever is less.

2. Wave direction (propagation) parallel and perpendicular to longitudinal axis of dock.

3. Docks must be analyzed for vertical wave load in operational and nonoperational conditions.

G. Vessel Impact Load

1. Where vessel weight is not provided, vessel docking weight may be estimated as 12 x L^2 where L represents the vessel length in feet.

2. Vessel draft = 10 percent x L, where L represents the vessel length in feet.

3. Approach Speed

a. Vessel approach speed of 3 fps for vessels 26 feet in length and below at an angle of 30 degrees to the longitudinal axis for side tie slips.

4. Impact loads must be based on the maximum vessel length to be accommodated at the dock and applied midway between pile supports.

H. Gangway Load: Superimposed dead load of the gangway structure and uniform live load on gangway tributary to the dock.

2.3 GANGWAY LOADING

A. Dead load of the structure including utilities supported by gangway.

B. Uniform Vertical Live Load of 100 psf on gangway.

C. Concentrated live load of 400 lbs, applied at any location.

D. Horizontal line load of 50 plf on railing. Concentrated load of 200 lbs, applied at any location. Concentrated lateral loads of 50 lbs on intermediate rails, pickets, and posts.

E. Horizontal wind load from non-operational wind speed applied over full profile area.

2.4 FLOAT SYSTEM MATERIALS

A. Aluminum floats are to be factory assembled in the largest possible shippable units. Modular structures must be designed for quick and easy assembly and disassembly with a minimum of bolts and connectors.

B. Aluminum Framing: Aluminum Alloy 6061-T6 or approved equal and must be in accordance with AA ADM Specification for Aluminum Structures, ASTM B209, ASTM B211/B211M, ASTM B221, ASTM B308/B308M, ASTM B429/B429M, and ASTM B574 for various metals used. All primary structural members must be extruded HSS profiles with a minimum thickness of 3/16 inch. All other framing members must be a minimum thickness of 1/8 inch. All welds must be in accordance with AWS D1.2/D1.2M.

C. Metal Accessories: All metal accessories must be Stainless Steel in accordance with ASTM F593, Group 2 and ASTM A276/A276M, Type 316L.

1. Structural Steel: Structural steel must be ASTM A276/A276M, Type 316L Stainless Steel.

2. Embedments: Embedments in dock must be ASTM F593, Group 2 stainless steel with welded loop or horizontal bar hook.

3. Fasteners: ASTM F593 and ASTM F594, Group 2 stainless steel. All bolts, screws, and nuts must be 316 Stainless Steel, unless otherwise noted. Washers must be used with all nuts and bolts.

4. Nuts: ASTM F594, Group 2 Stainless Steel.

5. Washers: Washers must comply with the requirements of ANSI B18.22.1 and must be Type 316 Stainless Steel. Washers must be used with all nuts and bolts. Use round plate washers for bearing on wood and cut washers for bearing on steel. Use beveled washers where bearing surfaces have a slope greater than 20:1 with respect to a plane normal to the bolt axis.

6. Dissimilar Metals: Where dissimilar metals are in contact, the surfaces must be protected with a coat of bituminous paint or separated by an isolation material to prevent galvanic action. Dissimilar metals must be isolated with a QPL-TT-P-664 protective coating to prevent galvanic or corrosive action.

7. Foam Core: Foam core floats must be a rigid block of closed cell expanded polystyrene (EPS) by Eagle Floats or approved equal. Properties of the foam must conform to ASTM C578 or ASTM D1621 with maximum water absorption less than 4 percent as determined by ASTM C272/C272M, method C. The EPS foam must have a unit weight between 0.90 - 1.20 pcf. No voids or gaps will be permitted. Lateral support by bolted connections only, through the encasement, will not be accepted.

a. Reground Materials Prohibited: All flotation material used in the fabrication of the float modules must be made from new material especially manufactured for the intended use. No reground materials is permitted and the supplier of the material must certify that no reground material is used in this project.

b. Flotation Units: All units must be rotationally molded for seamless one-piece construction with the foam core fully encapsulated. Flotation encapsulation material must be manufactured from linear virgin polyethylene resin suitable for a marine environment containing UV ray inhibitors and minimum 2% carbon black pigment. Nominal wall thickness must be a minimum of 0.150 inch with a minimum wall thickness of 0.125 inch. Flotation units must be designed to maintain the desired buoyancy and freeboard even if punctured or cracked. Flotation unit and frame to act as one integral unit.

8. Dock Accessories

a. Decking

Plastic lumber for cover boards over waters, knee braces/fillets, and pile guide formwork must be fiberglass reinforced HDPE plastic lumber by WearDeck or approved equal, Color Sand. Material must contain UV inhibitor, be flame retardant, slip resistant and fungal resistant. Plastic lumber used in structural applications must be in accordance with ASTM D 1761, ASTM D2395, ASTM D6109, and ASTM D6111. Attach plastic lumber with stainless steel fasteners, in accordance with manufacturer's recommendation. Plastic Lumber must be consistent with the plastic lumber selected for composite decking on the timber docks.

Decking material on all docks (including over knee brace/ fillets) must be suitable for the marine environment and provide a non-slip walking surface. All decking must be free of extra holes, broken screws, and misaligned screw drive lines. Decking must consist of 2X6 or 2X8 composite timber decking boards, by Weardeck or approved equal, color Sand.

Cutting of composite decking must be done with a carbide-tipped saw blade to maintain clean-cut edges. Edges of boards must be aligned with no variation in length from one board to the next. Deck planks must be placed perpendicular to the longitudinal axis of the main walk.

b. Cleats: Dock cleats must be cast iron or cast steel, hot dipped galvanized open base cleats with size and spacing as indicated on the Drawings, minimum 12 inches. Attach cleats to the dock structure based on Manufacturers' recommendations.

c. Ladders: Safety ladders must be ASTM B221 Aluminum 600 Series or ASTM A276/A276M 316L Stainless Steel, designed in accordance with OSHA standards.

2.5 GANGWAY MATERIALS

A. Aluminum: Aluminum alloy must be 6061-T6. Extruded in accordance with the applicable requirements of SAE AMS-QQ-A-200/8 and ASTM B221. Aluminum welding must be in accordance with AWS D1.2/D1.2M.

B. Fasteners

1. ASTM F593, Group 2 316L stainless steel bolts.

2. ASME B18.21.1, Type 316L stainless steel washer, or 1/4 inch thick Type 316L plate washer.

3. ASTM F593, Group 2 316L austenitic stainless steel nuts.

C. Castings: F-214 Cast aluminum. Castings must be true to pattern, structurally sound and free from blow holes or other defects.

D. Insulators: MIL-I-24768/14. Bushings or separation sheets must be a minimum of 1/16 in thickness.

E. Wheels: CID A-A-55619, UHMW polyurethane, with UV inhibitors added. Color must be black.

PART 3 - EXECUTION

3.1 FLOATING DOCK SYSTEM FABRICATION

A. Float Identification: Each aluminum float must be permanently marked on one side and one end, between the bottom of the waler and the waterline in an accessible location. Identification must include name of Manufacturer, date of manufacture, specific float type, casting date, and job number using a stamp or stencil of a type and design approved by the Engineer.

3.2 PRODUCT TESTING

A. Submit a complete and accurate record of test procedures, methodology, equipment, and results for each test.

3.3 OPERATION AND MAINTENANCE MANUAL

A. Submit a project specific operation and maintenance manual for the floating dock system prior to completion of the project. Provide manual in electronic PDF file format and bound, hard copy format with manual titled "Floating Dock System Operation and Maintenance Manual". Manual must include the following as a minimum:

1. Recommendations for operating floating dock system such as sizing and tying-up vessels consistent with the designer's assumptions and highlighting the limitations on berth occupancy to prevent overloading the dock system.

2. Recommendations for preventive maintenance, maintenance procedures, and materials by brand name and specification.

3. Manufacturer's O&M information required by the paragraph, OPERATION AND MAINTENANCE DATA.

4. Catalog data required by the paragraph, PRODUCT DATA.

5. Final approved shop drawings required by the paragraph, SHOP DRAWINGS.

6. Prices for spare parts and supply list.

3.4 INSTALLATION

A. Installation of floating dock system must be in accordance with approved shop drawings with connections tightened as required after complete installation of each unit of the work in the water and before final inspection. Decking, spacers, panels, or any other members, which are subject to foot traffic, must be flush with the walking surface.

B. Install stiff arm anchoring system in accordance with section 31 62 16 STEEL PIPE PILES.

C. Bolted Connections

1. Provide anchorage for fastening work in place. Conceal fasteners where practicable. Fasteners must not protrude beyond the fascia into the berthing area. Fasteners protruding above the surface of the deck must have a low, rounded profile.

2. Bolts must be of the size required, with adequate thread length. Make threaded connections up tight and nick threads to prevent loosening. Holes for all lag bolts and screws must be pre-drilled and turned into place.

D. Welding: AWS D1.2/D1.2M. All welding must be performed under the supervision of certified welders. Protect the concrete and other reinforcing from heat during welding. Weld continuously along the entire area of contact. Grind smooth visible welds in the finished installation. Welding of epoxy-coated reinforcing is not permitted.

3.5 OPENINGS

A. Holes or cuts in the dock floats, which are not indicated on the approved shop drawing, must only be made with the approval of the City

3.6 DOCK ACCESSORIES

A. All dock accessories, supports, and services, must be installed in accordance with the drawings, specifications, and the manufacturer's recommended method of installation. Schedule installation of dock accessories to avoid damage from other work.

3.7 DOCK SYSTEM TOLERANCES

A. Install floating dock system to the planned dimensions within the tolerances specified herein. Any float exceeding the allowable fabrication and installation tolerances must be removed and replaced.

B. Float Fabrication Tolerances: Float Fabrication Tolerances (allowable deviation of construction dimension from nominal dimension shown on the Drawings):

1. Float Width: +/- 3 inches from nominal float width.

2. Float Depth: +/- 1 inch design depth as required to satisfy freeboard requirements.

C. Float Installation Tolerances: The dock system must be installed within 3 inches of the design position. The dock system must not move more than 4 inches laterally from the design position in any direction when operational lateral loads are applied.

1. Dock Freeboard: Dock freeboard must be within +/- 1 inch of specified freeboard. Dock freeboard that is less than specified may be corrected by placing supplemental flotation under the dock only with the approval of the Engineer. Supplemental floats must consist of expanded polystyrene foam core fully encapsulated in polyurea coating or polyethylene shells, 0.15 inches minimum thickness, designed for complete submersion in water with no vents or air valves. The floats must adhere to dock using high strength, water activated glue or interlock with the dock to prevent lateral displacement without the use of steel fasteners.

2. Pile Tolerances:

a. At cut-off elevation, the head of the pile must be within 3 inches of the design location. The top of pile after cut-off must be within 0.5 inch of the design cut-off elevation. A maximum variation of 0.25-inch per foot of pile length from the vertical for plumb piles.

b. Heaved piles that have been forced up by more than 0.25 inch by any cause must be redriven.

c. Manipulation of driven piles to achieve the specified tolerances is not permitted.

END OF SECTION 35 51 14

SECTION

B

(USE THIS FORM ONLY)

SUBMIT PROPOSALS IN CARE OF:
Project Management Department
City of Greenville
2000 Cedar Lane
Greenville, NC 27858
(252) 329-4242

BIDDER'S FIRM NAME_____

DATE:_____

PROPOSAL: **Town Common Bulkhead and Esplanade Project**
The Undersigned, as Bidder, hereby declares that only person or persons interested in this proposal as principals or principals is or are named herein and that no other persons than herein mentioned has any interest in this proposal or in the contract to be entered, that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respect fair and in good faith without collusion or fraud.

The bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the specifications for the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids, that he has satisfied himself relative to the work to be performed.

Materials to be furnished shall be in compliance with standard specifications and special provisions. CONTRACTOR'S responsibility shall continue uninterrupted until expiration of the warranty period as stated in the specifications after completion of the work. The owner (City of Greenville) reserves the right to select any or all of the alternates and to increase or decrease the total contract amount utilizing the unit prices supplied by the CONTRACTOR in the bid form.

The Bidder agrees, if his proposal is accepted, to contract with the City of Greenville, 200 West Fifth Street, Greenville, NC 27858, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation, and labor necessary to complete within the time allotted as specified, the General Construction work on the Owner's property, in complete accordance with the Plans, Specifications, and Contract Documents bearing the title **Town Common Bulkhead and Esplanade Project**, with a definite understanding that no money will be allowed for extra work except as set forth in the Contract Documents for the sums as follows:

Base Bid:

($_____)_____dollars

ADDENDA

The following addenda are acknowledged as having been received and noted, the provisions for which are included in the proposal(s). Failure to acknowledge receipt of any addenda will subject the bidder to disqualification. CONTRACTOR to sign.

Addendum No. 1: _____

Addendum No. 2: _____

ALTERNATES

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" the base bid.

Alternate No. 1: Floating Dock & Debris Deflector

Alternate No. 2: Nature Walk

Alternate No. 3: Timber Bridge & Overlook Platform

Alternate No. 4: Decorative Fountain ($200,000 Allowance for Design and Construction)

UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

GENERAL CONTRACT:

No. 1 General Conditions

No. 2 Concrete Demolition

No. 3 Steel Sheet Pile Demolition

No. 4 Fill Removal, Storage, & Grading

No. 5 Steel Pipe Pile Installation

No. 6 Cast-in-Place Concrete Cap Construction

No. 7 Cast-in-Place Concrete Retaining Wall Construction

No. 8 Steel Sheet Pile Construction

No. 9 Soil Anchor Construction

No. 10 Timber Boardwalk Construction

No. 11 Select Fill, Geotextile, and Grading

REQUIRED FORMS

The following forms have been completed by the CONTRACTOR and are attached hereto. CONTRACTOR to sign.

MBE / WBE Form(s):

Refer to the Instructions section found on page 3 of the MBE / WBE Forms in the Project Manual.

*** * * * * * * * * * * * * * * * * * ***

KNOW ALL PERSONS BY THESE PRESENTS, That we, the PRINCIPAL AND SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue. As used hereinabove, "modifications" shall include, without limitation, changes (including, without limitation, changes granting extensions of time) and additions to or with respect to the work, scope of work, and specifications.

*** * * * * * * * * * * * * * * * * ***

The Performance Bond and the Payment Bond are being combined here only for purposes of convenience in signing and acknowledging, and the obligations of the Principal and of the Surety are the same as if the bonds were on separate documents. Each bond is in the dollar amount stated above, and the amounts of these bonds are not combined. The Surety agrees that both of these bonds are fully binding on it whether or not the Principal executes these bonds. These bonds are given pursuant to Article 3 of Chapter 44A of the N. C. General Statutes.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument (for both the Performance Bond and the Payment Bond) under their several seals on the date of execution indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____

(name of Principal)

[Execution by Principal when the Principal is a corporation]

By:_____

Title of officer: _____

(*Affix Principal's corporate seal*.)

[Execution by Principal when the Principal is a limited liability company]

By:_____

Manager of Principal

[Surety's execution]

_____

(name of Surety)

_____

(signature of attorney in fact)

(Affix Surety's corporate seal.)

*(Instructions to Surety and Principal: **If you use a raised corporate seal, press hard enough to make it legible**.)*

Bid Bond for City of Greenville:

Refer to the Bid Bond forms found in the Project Manual. ***Use these forms only.***

Respectfully submitted this_____day of_____, 2025.

Signature:_____

Title: _____

Firm: _____

Address: _____

_____

License No._____ Expiration Date:_____

BID BOND for the City of Greenville

Contract name and number or other description of the Contract:

Name of Bidder:

Name, address, and telephone number of Surety's N. C. Resident Agent:

Telephone number of Surety's home office:

Surety is a corporation organized and existing pursuant to the laws of the State of:

Amount of this bond: *check (a) or (b):*

____(a) *(write or type the amount in words and figures*) All numbers in this section are in U. S. dollars.

($)

____(b) five percent of the amount of the proposal

Bond number:

Date of execution of this bond:

Obligee: CITY OF GREENVILLE, a North Carolina municipal corporation.

- *** * * * * * * * * * * * * * * * ***

KNOW ALL PERSONS BY THESE PRESENTS, that the Surety executing this bond, which Surety is duly licensed to act as surety in North Carolina, is held and firmly bound unto the City of Greenville, Obligee, in the penal sum of the amount stated above, for the payment of which sum, well and truly to be made, the Surety binds itself and its successors and assigns, jointly and severally, by these presents. Whereas the Bidder is herewith submitting a proposal for the Contract referred to above, and the Bidder desires to file this Bid Bond in lieu of making the cash deposit pursuant to G.S. 143-129; NOW THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that if the Bidder shall be awarded the contract for which the bond is submitted, and shall, within ten days after the award is made, execute and deliver to the Obligee the contract and give satisfactory surety as required by G.S. 143-129, then this obligation shall be null and void, otherwise to remain in full force and virtue; and if the Bidder fails or refuses to so execute and deliver said contract or give said satisfactory surety, the Surety shall upon demand forthwith pay to the Obligee the full penal sum of this bond. The Surety waives all extensions of time, and notice of extensions of time, for the opening of proposals and for the modification, award, execution, and delivery of the contract. IN WITNESS WHEREOF, the Surety has executed this instrument under its seal as of the date of execution indicated above, pursuant to authority of its governing body.

_____

(name of Surety)

_____

(signature of Surety's attorney in fact)

(Affix Surety's corporate seal)

(Instructions to Surety: If you use a raised corporate seal, press hard enough to make it legible.)

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

This Agreement is by and between the City of Greenville ("Owner") and **[name of contracting entity]** ("Contractor").

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

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: See section 01 11 00 – Summary of Work from the construction documents.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Greenville Town Common & Esplanade Project.

ARTICLE 3—ENGINEER

3.01 The Owner has retained Moffatt & Nichol ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Engineer.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is 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.

4.03 *Contract Times: Days*

A. The Work will be substantially complete within 400 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions.

4.04 *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 and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. 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):

1. *Substantial Completion:* Contractor shall pay Owner $**[number]** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.

2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $**[number]** for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. For all Work, a lump sum of $**[number]**.

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 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 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 5th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in 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 elsewhere in the Contract.

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 Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. **95** percent of the value of the Work completed (with the balance being retainage).

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.
2. Bonds:
    a. Performance bond (together with power of attorney).
    b. Payment bond (together with power of attorney).
3. General Conditions.
4. Supplementary Conditions.
5. Specifications as listed in the table of contents of the project manual (copy of list attached).
6. Drawings listed on the attached sheet index.
7. Addenda (numbers **[number]** to **[number]**, inclusive).
9. Exhibits to this Agreement (enumerated as follows):
    a. Town Common Civic Center Bulkhead Geotechnical Engineer Report
    b. Town Common Park Bulkhead and Esplanade Geotechnical Engineer Report
    c. DWR 401 Authorization Certificate with Additional Conditions
    d. USACE Nationwide Permit 3
    e. USACE Regional General Permit
10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.

d. Field Orders.

e. Warranty Bond, if any.

B. The Contract Documents listed in Paragraph 7.01.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 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:

1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

6. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no 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.

7. 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.

8. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

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

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

8.02 *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 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything 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.

8.03 *Standard General Conditions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

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

Contractor:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

_____

_____

_____

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

_____

_____

_____

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

ACKNOWLEDGMENT OF SURETY'S EXECUTION OF BID BOND

State of _____ County of _____

I, _____, a notary public in and for said county and state, certify that _____ personally appeared before me this day and acknowledged that he or she is Attorney in Fact for _____, the Surety named in the foregoing Bid Bond, in which bond the Obligee is the City of Greenville, and that he or she executed said bond, under the seal of the Surety, on behalf of the Surety.

This the _____ day of _____, 20_____.

My commission expires: _____

_____
Notary Public

PERFORMANCE BOND AND PAYMENT BOND

Date of Contract**:**

Contract Name and Number**:**

Name of Principal (Name of Contractor)**:**

The Principal is organized and existing under the laws of the following State**:**

Name of Surety**:**

Name, address, and telephone number of Surety's N. C. Resident Agent**:**

Amount of Performance Bond (in words and figures)**:**

dollars

($)

Bond number**:**

Date of Execution of these Bonds**:**

Contracting Body: **CITY OF GREENVILLE, a North Carolina municipal corporation**.
Amount of Payment Bond: **same dollar amount as the dollar amount of the Performance Bond.**

*** * * * * * * * * * * * * * * * * * ***

KNOW ALL PERSONS BY THESE PRESENTS, That we, the PRINCIPAL AND SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue. As used hereinabove, "modifications" shall include, without limitation, changes (including, without limitation, changes granting extensions of time) and additions to or with respect to the work, scope of work, and specifications. The undertakings, covenants, terms, conditions, and agreements of said contract shall include, without limitation, the Principal's obligations, if any, with respect to damages for delay, to indemnify, and to provide warranties.

ACKNOWLEDGMENT OF CONTRACTOR'S EXECUTION OF CONTRACT AND PERFORMANCE BOND AND PAYMENT BOND

[Acknowledgment when the Contractor (the Principal) is a corporation]

State of_____ County of _____

I, a notary public in and for the aforesaid county and state, certify that _____ _____ personally appeared before me this day and stated that he or she is

(***strike through the inapplicable***:) chairperson/ president/ chief executive officer/ vice-president/ assistant vice-president/ treasurer/ chief financial officer of _____ _____, a corporation, and that by authority duly given and as the act of the corporation, he or she signed the foregoing contract with the City of Greenville and Performance Bond and Payment Bond with respect to the contract and the corporate seal was affixed to said instrument(s). Thisthe _____day of_____, 20_____.

My commission expires: _____

Notary Public

[Acknowledgment when the Contractor (the Principal) is a limited liability company]

State of_____ County of _____

I,_____, a notary public for said county and state, certify that_____(1) appeared before me this day, (2) stated that he or she is a manager of _____ _____, a limited liability company, (3) acknowledged that the foregoing contract with the City of Greenville and the Performance Bond and Payment Bond with respect to the contract carry on the company's business in the usual way, and (4) acknowledged the due execution of the contract and the Performance Bond and Payment Bond on behalf of the company.

This the_____day of_____, 20_____.

My commission expires: _____

Notary Public

ACKNOWLEDGMENT OF SURETY'S EXECUTION OF PERFORMANCE BOND AND PAYMENT BOND

State of_____ County of_____

I, a notary public in and for the aforesaid county and state, certify that _____personally appeared before me this day and stated that he or she is Attorney in Fact for _____, the Surety named in the foregoing Performance Bond and Payment Bond, in both of which bonds the contracting body is the City of Greenville, and that he or she executed said bonds, under the seal of the Surety, on behalf of the Surety.

This the_____ day of_____, 20_____.

My commission expires: _____

_____
Notary Public

City of Greenville/Greenville Utilities Commission
Minority and Women Business Enterprise (MWBE) Program

City of Greenville
Construction Guidelines and Affidavits
$100,000 and above

These instructions shall be included with each bid solicitation.

MBForms 2002-
Revised July 2010
Updated 2019

City of Greenville/Greenville Utilities Commission
Minority and Women Business Enterprise Program

$100,000 and Construction Guidelines for MWBE Participants

Policy Statement

It is the policy of the City of Greenville and Greenville Utilities Commission to provide minorities and women equal opportunity for participating in all aspects of the City's and Utilities' contracting and procurement programs, including but not limited to, construction projects, supplies and materials purchases, and professional and personal service contracts.

Goals and Good Faith Efforts

Bidders responding to this solicitation shall comply with the MWBE program by making Good Faith Efforts to achieve the following aspiration goals for participation.

	CITY	
	MBE	**WBE**
Construction This goal includes Construction Manager at Risk.	10%	6%

Bidders shall submit MWBE information with their bids on the forms provided. This information will be subject to verification by the City prior to contract award. **As of July 1, 2009, contractors, subcontractors, suppliers, service providers, or MWBE members of joint ventures intended to satisfy City MWBE goals shall be certified by the NC Office of Historically Underutilized Businesses (NC HUB) only.** Firms qualifying as "WBE" for City's goals must be designated as a "women-owned business" by the HUB Office. Firms qualifying as "MBE" for the City's goals must be certified in one of the other categories (i.e.: Black, Hispanic, Asian American, American Indian, Disabled, or Socially and Economically Disadvantaged). Those firms who are certified as both a "WBE" and "MBE" may only satisfy the "MBE" requirement. **Each goal must be met separately. Exceeding one goal does not satisfy requirements for the other.** A complete database of NC HUB certified firms may be found at http://www.doa.nc.gov/hub/. An internal database of firms who have expressed interest to do business with the City and GUC is available at www.greenvillenc.gov. However, the HUB status of these firms must be verified by the HUB database. The City shall accept NCDOT certified firms on federally funded projects only. Please note: A contractor may utilize any firm desired. However, for participation purposes, all MWBE vendors who wish to do business *as a minority or female* must be certified by NC HUB.

The Bidder shall make good faith efforts to encourage participation of MWBEs prior to submission of bids in order to be considered as a responsive bidder. Bidders are cautioned that even though their submittal indicates they will meet the MWBE goal, they should document their good faith efforts and be prepared to submit this information, if requested.

The MWBE's listed by the Contractor on the **Identification of Minority/Women Business Participation** which are determined by the City to be certified shall perform the work and supply the materials for which they are listed unless the Contractors receive prior authorization from the City to perform the work with other forces or to obtain materials from other sources. If a contractor is proposing to perform all elements of the work with his own forces, he must be prepared to document evidence satisfactory to the owner of similar government contracts where he has self-performed.

The Contractor shall enter into and supply copies of fully executed subcontracts with each MWBE or supply signed Letter(s) of Intent to the Project Manager after award of contract and prior to Notice to Proceed. Any amendments to subcontracts shall be submitted to the Project Manager prior to execution.

Instructions

The Bidder shall provide with the bid the following documentation:

☐ Identification of Minority/Women Business Participation
(if participation is zero, please mark zero—Blank forms will be considered nonresponsive)

☐ Affidavit A (if subcontracting)

OR

☐ Identification of Minority/Women Business Participation
(if participation is zero, please mark zero—Blank forms will be considered nonresponsive)

☐ Affidavit B (if self-performing; will need to provide documentation of similar projects in scope, scale and cost)

Within 72 hours or 3 business days after notification of being the apparent low bidder who is subcontracting anything must provide the following information:

☐ Affidavit C (if aspirational goals are met or are exceeded)

OR

☐ Affidavit D (if aspirational goals are not met)

After award of contract and prior to issuance of notice to proceed:

☐ Letter(s) of Intent or Executed Contracts

****With each pay request, the prime contractors will submit the Proof of Payment Certification, listing payments made to MWBE subcontractors.**

*****If a change is needed in MWBE Participation, submit a Request to Change MWBE Participation Form. Good Faith Efforts to substitute with another MWBE contractor must be demonstrated.**

Minimum Compliance Requirements:

All written statements, affidavits, or intentions made by the Bidder shall become a part of the agreement between the Contractor and the City for performance of contracts. Failure to comply with any of these statements, affidavits or intentions or with the minority business guidelines shall constitute a breach of the contract. A finding by the City that any information submitted (either prior to award of the contract or during the performance of the contract) is inaccurate, false, or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the City whether to terminate the contract for breach or not. In determining whether a contractor has made Good Faith Efforts, the CITY will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts.

Identification of Minority/Women Business Participation

I,_____,
(Name of Bidder)

do hereby certify that on this project, we will use the following minority/women business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work type	*MWBE Category

*MWBE categories: Black, African American (**B**), Hispanic, Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

If you will not be utilizing MWBE contractors, please certify by entering zero "0"

The total value of MBE business contracting will be ($)_____.

The total value of WBE business contracting will be ($)_____.

City of Greenville AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of_____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ❑ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ❑ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ❑ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ❑ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ❑ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ❑ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ❑ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ❑ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ❑ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ❑ **10** - **(20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority/Women Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority/women business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20_____

Notary Public_____

My commission expires _____

MBForms 2002-
Revised July 2010
Updated 2019

City of Greenville --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____

_____ contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

SEAL

State of _____, County of _____

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

Notary Public _____

My commission expires _____

City of Greenville - AFFIDAVIT C - Portion of the Work to be Performed by MWBE Firms

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by MWBE businesses as defined in GS143-128.2(g) and the COG/CITY MWBE Plan sec. III is equal to or greater than 16% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises and a minimum of _____% of the total dollar amount of the contract with women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*MWBE Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with MWBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

SEAL

Signature:_____

Title:_____

State of _____, County of _____
Subscribed and sworn to before me this _____day of _____20_____
Notary Public_____
My commission expires_____

MBForms 2002-
Revised July 2010
Updated 2019

City of Greenville AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 16% participation by minority/women business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises and a minimum of _____% of the total dollar amount of the contract with women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*MWBE Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**),Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Examples of documentation required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster.

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the

next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with MWBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of _____, County of _____

Subscribed and sworn to before me this _____day of _____20_

Notary Public_____

My commission expires _____

LETTER OF INTENT
MWBE Subcontractor Performance

Please submit this form or executed subcontracts with MWBE firms after award of contract and prior to issuance of notice to proceed.

PROJECT: _____
(Project Name)

TO: _____
(Name of Prime Bidder/Architect)

The undersigned intends to perform work in connection with the above project as a:

____Minority Business Enterprise _____Women Business Enterprise

The MWBE status of the undersigned is certified the NC Office of Historically Underutilized Businesses (required). ____Yes ____No

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project at the following dollar amount:

Work/Materials/Service Provided	Dollar Amount of Contract	Projected Start Date	Projected End Date

_____
(Date)

_____ _____
(Address) (Name & Phone No. of MWBE Firm)

_____ _____
(Name & Title of Authorized Representative of MWBE) (Signature of Authorized Representative of MWBE)

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REQUEST TO CHANGE MWBE PARTICIPATION

(Submit changes only if notified as apparent lowest bidder, continuing through project completion)

Project: _____

Bidder or Prime Contractor: _____

Name & Title of Authorized Representative: _____

Address: _____ **Phone #:** _____

_____ **Email Address:** _____

Total Contract Amount (including approved change orders or amendments): $_____

Name of subcontractor: _____

Good or service provided: _____

Proposed Action:

___Replace subcontractor
___Perform work with own forces

For the above actions, you must provide one of the following reasons (Please check applicable reason):

____The listed MBE/WBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract.

___The listed MBE/WBE is bankrupt or insolvent.

___The listed MBE/WBE fails or refuses to perform his/her subcontract or furnish the listed materials.

__The work performed by the listed subcontractor is unsatisfactory according to industry standards and is not in accordance with the plans and specifications; or the subcontractor is substantially delaying or disrupting the progress of the work.

If replacing subcontractor:

Name of replacement subcontractor: _____

The MWBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required). ___Yes ____No

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Other Proposed Action:

___Increase total dollar amount of work
___Decrease total dollar amount of work
___Add additional subcontractor
___Other

Please describe reason for requested action: _____

_____

If adding additional subcontractor:*

The MWBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required).___Yes ____No

**Please attach Letter of Intent or executed contract document*

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Interoffice Use Only:

Approval _Y _N

Date_____

Signature_____

Pay Application No. _____

Purchase Order No. _____

Proof of Payment Certification

MWBE Contractors, Suppliers, Service Providers

Project Name: _____

Prime Contractor: _____

Current Contract Amount (including change orders): $_____

Requested Payment Amount for this Period: $_____

Is this the final payment? ___Yes ___No

Firm Name	MWBE Category*	Total Amount Paid from this Pay Request	Total Contract Amount (including changes)	Total Amount Remaining

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Date:_____

Certified By: _____
Name

_____
Title

_____
Signature

MBForms 2002-
Revised July 2010
Updated 2019

Title VI of the Civil Rights Act of 1964 Nondiscrimination Provisions, Appendices A & E.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1) Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation (USDOT), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, sex, age, creed (religion), low-income, limited English proficiency, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

(3) Solicitations for Subcontractors, 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 will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the USDOT to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the USDOT, as appropriate, and will set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the USDOT may determine to be appropriate, including, but not limited to:

(a) withholding payments to the contractor under the contract until the contractor complies; and/or
(b) cancelling, terminating, or suspending a contract, in whole or in part.

(6) Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the USDOT may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

I. During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

Pertinent Nondiscrimination Authorities

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq);
- Federal transit laws, specifically 49 U.S.C. § 5332 (prohibiting discrimination based on race, color, religion, national origin, sex (including gender identity), disability, age, employment, or business opportunity).

APPENDIX

A

REFERENCE DRAWINGS

- Shore Drive Project Details for Retaining Wall, Esplanade, Etc.
  Sheets 2, 9, 11
  Rivers and Associates, Inc.
  As-Built Drawings Dated August 11, 1967

APPENDIX

B

GEOTECHNICAL REPORT

- Town Common Civic Center and Bulkhead Geotechnical Engineer Report
  Terracon Consultants, Inc.
  Report Dated February 11, 2022

- Town Common Park Bulkhead and Esplanade Geotechnical Engineer Report
  Terracon Consultants, Inc.
  Report Dated May 16, 2024

Geotechnical Engineering Report

Town Common Civic Center and Bulkhead
Greenville, Pitt County, North Carolina
February 11, 2022
Terracon Project No. 72215104

Prepared for:
The East Group, P.A.
Greenville, NC

Prepared by:
Terracon Consultants, Inc.
Greenville, North Carolina

February 11, 2022

The East Group, P.A.
324 Evans Street
Greenville, NC 27858

Attn: Ms. Myriah Shewchuk, PLA / Senior Landscape Architect
P: (252) 758-3746
E: myriah.shewchuk@eastgroup.com

Re: Geotechnical Engineering Report
Town Common Civic Center and Bulkhead
105 E 1st Street
Greenville, Pitt County, North Carolina
Terracon Project No. 72215104

Dear Ms. Shewchuk:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P71215104 dated October 19, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Branson Rogers
Geotechnical Professional

Andrew J. Gliniak, PE
Project Engineer
Registered NC 042183

James (Jim) Hoskins, III, PE
Sr. Principal / Office Manager (Greensboro, NC)

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic [1]	Overview Statement [2]
Project Description	The project includes a proposed civic building, a reconstruction of the existing amphitheater, and the repair and/or replacement of the existing bulkhead.
Geotechnical Characterization	The subsurface exploration encountered fill to depths of 13 feet at all exploration locations underlain by varying loose to very dense sand and soft to stiff clay. Groundwater is anticipated at a depth of approximately 10 to 14 feet below existing grades. However, groundwater can fluctuate to/above the surface due to the river.
Geotechnical Overview	At depths of 28 feet to 38 feet below the existing ground surface, very dense sand will likely be encountered that could impede sheet pile driving. The fill encountered during our exploration appears suitable for foundation and floor slab support after the recommended **Earthwork**. However, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. The building can be supported by shallow foundations after vibratory rolling the subgrade and **Earthwork**. Underground utilities that will not remain in-service within the proposed building footprint should be abandoned by removal and replacement with compacted fill during earthwork. Groundwater encountered in excavations should be removed until the excavations are backfilled.
Earthwork	After stripping, the exposed subgrade soils in the building footprint should be densified in place using a medium weight vibratory roller. Static rolling should be performed within 30 feet of the existing building to prevent damage due to excess vibrations. The purpose of the rolling is to densify the exposed subgrade soils for floor slab and to potentially improve the foundation bearing soils.
Shallow Foundations	Allowable bearing pressure = 1,000 psf for civic building = 2,000 psf for amphitheater Expected settlements: < 1-inch total, <1/2 inch differential settlement
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report

Town Common Civic Center and Bulkhead

105 E 1st Street

Greenville, Pitt County, North Carolina

Terracon Project No. 72215104

February 11, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed additions to be located at 105 E 1st Street in Greenville, Pitt County, North Carolina. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Seismic site classification
- Floor slab design and construction
- Retaining wall design parameters

The geotechnical engineering Scope of Services for this project included the advancement of 10 test borings to depths of approximately 20 feet to 75 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at the Town Commons Park on 105 E 1st Street in Greenville, Pitt County, North Carolina. See **Site Location**.
Coordinates	N 35.6159°, W 77.3690° (approximate)

Item	Description
Existing Improvements	Town Common Park is developed with an amphitheater, playground, boat launch, and various utilities running through the site. There is an existing bulkhead, approximately 1,250 feet, that borders the river at the north end of the park.
Current Ground Cover	Grass and sidewalks around existing development.
Existing Topography	Sloping towards the north to the adjacent Tar River. Elevations across the site range from 17 feet to 25 feet MSL. Elevations provided by Google Earth.

We also collected photographs at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

PROJECT DESCRIPTION

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An initial email communication on August 25, 2021 requesting budgetary pricing and subsequent emails requesting a proposal for a geotechnical investigation. Subsequent email communication since the initial request further defined proposed building construction. Email communication on October 14, 2021 provided an updated scope for the geotechnical study.
Project Description	■ A proposed civic building. The project is in preliminary stages, and the design is evolving. The size of the proposed development is undetermined, but will be approximately 6,000 SF to 12,000 SF. ■ A proposed reconstruction of the existing amphitheater. ■ A proposed repair and/or replacement of the existing bulkhead along the river's edge.
Proposed Structures	The project includes a multi-story civic building, likely to be two stories. Due to the proximity of the river, the building may be on piles. The structure for the amphitheater construction is unknown. A repair and/or a replacement of the river's bulkhead. The bulkhead could require additional sheet piles.
Building Construction	The civic building design is currently evolving. The building will be of steel framed construction with metal-stud walls with concrete slab on grade and an elevated concrete deck. The amphitheater is assumed to be steel framed supported by an anticipated shallow foundation system with a slab-on-grade floor system

Item	Description
Finished Floor Elevation	26 feet MSL, two feet above the flood plane
Maximum Loads (Provided by Structural)	■ Columns: Up to 50 kips to 125 kips assumed ■ Walls: Up to 2 kips per linear foot (klf) assumed ■ Slabs: 100 pounds per square foot (psf) assumed
Grading/Slopes	Up to 2 feet of fill is assumed to be required to develop final grade.
Below-Grade Structures	None
Stormwater Management	The site is assumed to utilize existing stormwater drains.
Estimated Start of Construction	Unknown

GEOTECHNICAL CHARACTERIZATION

Geology

The project site is located in the Coastal Plain Physiographic Province. The Coastal Plain soils consist mainly of marine sediments that were deposited during successive periods of fluctuating sea level and moving shoreline. The soils include sands, silts, and clays with irregular deposits of shells, which are typical of those lain down in a shallow sloping sea bottom. Recent alluvial sands, silts, and clays are typically present near rivers and creeks.

According to USGS Mineral Resources On-Line Spatial Data based on the 1998 digital equivalent of the 1985 Geologic Map of North Carolina updated in 1998, the site is mapped within the Yorktown Formation and Duplin Formation, Undivided (Tertiary).

Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Fill**	Fill consisting of silty sand, poorly graded sand, clayey sand, lean clay, and sandy lean clay.

2	**Denser soil**	Loose to very dense sand and medium stiff to stiff clay.
3	**Looser soil**	Very loose sand and very soft to soft clay.

Groundwater

Mud rotary drilling techniques were used to advance the borings which can obscure the detection of water levels. Groundwater was measured at depths between 10 feet to 14 feet below the existing ground surface after completion. Groundwater is estimated at depths of 10 feet to 14 feet below the existing surface based on the moisture condition of the soil samples, cave in-depths, and measured water levels. However, the area is prone to flooding from the river and groundwater levels can approach the surface due to the river.

The groundwater level can change due to seasonal variations in the amount of rainfall, runoff, river stage, and other factors not evident at the time the exploration was performed. It is not unusual for ground water to be within a few feet of the ground surface during times of the year in this region. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Our scope of work did not include the determination of the seasonal high-water table (SHWT) and infiltration rates for any proposed stormwater areas.

GEOTECHNICAL OVERVIEW

The subsurface exploration encountered fill to depths of 13 feet at all exploration locations underlain by varying loose to very dense sand and soft to stiff clay. At depths of 28 feet to 38 feet below the surface will likely encounter very dense sand that could impede sheet pile driving.

The fill encountered during our exploration appears suitable for foundation and floor slab support after the recommended **Earthwork**. However, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

After stripping topsoil and once any areas of cut are excavated to proposed subgrade elevation, the exposed subgrade soils in the building footprints should be densified in place using a medium weight vibratory roller. Static rolling should be used within 30 feet of existing structures. The purpose of the rolling is to densify the exposed subgrade soils for floor slab support and to potentially improve the foundation bearing soils.

Following the recommended **Earthwork**, the civic building and the amphitheater can be supported on shallow foundations bearing on approved existing soils or structural fill compacted as

recommended and sized for a maximum net allowable soil bearing pressure of 1,000 psf and 2000 psf, respectively. The **Shallow Foundations** section addresses support of the building bearing on densified existing natural soils or structural fill. The **Floor Slabs** section addresses slab-on-grade support of the building.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include excavations, densification, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations and floor slabs. Grading for the structure should incorporate the limits of the proposed structure plus 5 feet beyond proposed perimeter building walls and any exterior columns.

Site Preparation

Site preparation should begin with the surface vegetation, topsoil, and all associated utilities that will not remain in-service in the proposed building footprint. Stone base, if encountered, can remain in-place if it withstands proofrolling. Based on site observations during the drilling process, topsoil and surface vegetation in the proposed building footprint areas should be stripped to a depth of approximately 6 inches. Topsoil may be reused in areas of the site to be landscaped but should not be used as structural fill or backfill.

After stripping and removing topsoil and once any areas of cut have been excavated to proposed subgrade elevation, the exposed subgrade soils in the building footprints should be densified in place using a medium weight vibratory roller. Static rolling should be performed within 30 feet of the existing structures to prevent damage due to excess vibrations. The purpose of rolling is to densify the exposed subgrade soils for floor slab support and to potentially improve the foundation bearing soils. The roller should make at least six passes across the site, with the second set of three passes perpendicular to the first set of three passes. If water is brought to the surface by rolling, the operation should be discontinued until the water subsides. Rolling should be completed during dry weather. Static rolling and additional repairs should be anticipated for areas too wet for vibratory rolling.

After the vibratory rolling, pore pressures should be allowed to dissipate for a minimum of 16 hours. After the waiting period, proofrolling should be performed on the exposed subgrade soils in areas to receive fill or at the subgrade elevation with a loaded, tandem-axle dump truck (15 to 20-ton total vehicle weight) or similar rubber-tired construction equipment. Proofrolling is recommended as a means of detecting areas of soft or unstable subgrade soils. The proofrolling should be performed during a period of dry weather to avoid degrading an otherwise suitable

subgrade. The proofrolling operations should be observed the Geotechnical Engineer. Subgrade soils that exhibit excessive rutting or deflection during proofrolling should be repaired as directed by the field representative. Typical repairs include scarification/moisture conditioning and recompacting, over excavation followed by replacement with either properly compacted fill or by a subgrade stabilization fabric in conjunction with a sand fill or crushed stone as previously mentioned.

Existing Fill

As noted in **Geotechnical Characterization**, the borings locations encountered existing fill consisting of a mix of sand and clay to depths of approximately 5 feet to 13 feet. Generally, floor slabs and foundations could be supported on or above the remaining existing fill soils that have been densified in place and withstand proofrolling. However, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. Installing piles for deep foundation is another option to mitigate the risk associated with using existing fill.

Fill Material Types

Earthen materials used for structural fill should meet the following material property requirements.

Soil Type [1]	USCS Classification	Acceptable Location for Placement
Imported Soil	SC, SM, SP, SP-SM	All location and elevations.
On-Site Low to Moderate Plasticity Soils	SM, SP, SP-SM	All locations and elevations.

1. Structural fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Clay soils are not recommended for use as structural fill due to their high fines content, existing wet condition, and moisture sensitivity relative to the sandy soils that are available.

Fill Compaction Requirements

Structural fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements [1, 2, 3]	95% of maximum	92% of maximum
Water Content Range [1, 3]	-2% to +2% of optimum	As required to achieve min. compaction requirements

1. Fill should be tested for moisture content and compaction during placement. If in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the tests should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. It is not necessary to achieve 95% compaction on the existing ground prior to placing fill or beginning construction. However, the subgrade should be evaluated by a representative of the geotechnical engineer prior to placing fill or beginning construction.
3. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).

Utility Abandonment

Special precautions should be made to remove all underground utilities and their associated backfill as the proposed structure's foundations may overlay these materials. Terracon considers removing the utilities and underground structures and backfilling the resulting trenches to be the preferred method of abandonment. In-place abandonment by filling piping with grout should only be considered in the building footprint after checking the location of the piping in both plan and elevation space for potential conflict with the proposed foundations, construction, and new utilities. Care should be given to locating and addressing these items during the site preparation phase of the project. If overlooked, they could be detrimental to the long-term performance of the structure.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 5 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 5 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Groundwater encountered in excavations should be pumped out from sumps or well points if applicable. Pumping water, as required, should continue until excavations are completely backfilled

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of

compacted fill in the building areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

BULKHEAD DESIGN PARAMETERS

Based on the results of field and laboratory testing, we have developed the following design parameters at boring locations B-1 through B-4 for the CWALSHT design program:

B-1 CWALSHT Soil Design Parameters								
Depth (feet)	**Estimated Saturated Unit Weight, ɣ (pcf)**	**Effective Unit Weight, ɣ' (pcf)**	**Effective Angle of Internal Frication, Φ' (degrees)**	**Cohesion (ksf)**	**Adhesion factor**	**Skin Friction Angle, (degrees)**	k-value (pci)	ε_{50}
0 to 3	118	55.6	30	-	-	11	50	-
3 to 5	123	60.6	-	0.25	0.225	-	20	0.025
5 to 18	113	50.6	29	-	-	11	35	-
18 to 23	110	47.6	28	-	-	11	20	-
23 to 28	123	60.6	33	-	-	11	80	-
28 to 38	110	47.6	28	-	-	11	20	-
38 to 43	125	62.6	34	-	-	11	90	-
43 to 68	115	52.6	30	-	-	11	35	-
68 to 75	126	63.6	-	1.5	1.35	-	500	0.01

B-2 CWALSHT Soil Design Parameters								
Depth (feet)	**Estimated Saturated Unit Weight, ɣ (pcf)**	**Effective Unit Weight, ɣ' (pcf)**	**Effective Angle of Internal Frication, Φ' (degrees)**	**Cohesion (ksf)**	**Adhesion factor**	**Skin Friction Angle, (degrees)**	k-value (pci)	ε_{50}
0 to 13	113	50.6	29	-	-	11	35	-
13 to 18	110	47.6	27	-	-	11	15	-
18 to 28	123	60.6	33	-	-	11	80	-
28 to 43	130	67.6	35	-	-	11	100	-
43 to 68	113	50.6	29	-	-	11	35	-
68 to 75	124	61.4	-	0.75	0.675	-	100	0.015

B-3 CWALSHT Soil Design Parameters								
Depth (feet)	**Estimated Saturated Unit Weight, ɣ (pcf)**	**Effective Unit Weight, ɣ' (pcf)**	**Effective Angle of Internal Frication, Φ' (degrees)**	**Cohesion (ksf)**	**Adhesion factor**	**Skin Friction Angle, (degrees)**	k-value (pci)	ε_{50}
0 to 10	113	50.6	29	-	-	11	35	-
10 to 18	110	47.6	28	-	-	11	20	-
18 to 28	118	55.6	31	-	-	11	60	-
28 to 43	130	67.6	35	-	-	11	100	-
43 to 48	120	57.6	32	-	-	11	75	-
48 to 68	113	50.6	29	-	-	11	35	-
68 to 75	126	63.6	-	1.5	1.35	-	500	0.010

B-4 CWALSHT Soil Design Parameters								
Depth (feet)	**Estimated Saturated Unit Weight, ɣ (pcf)**	**Effective Unit Weight, ɣ' (pcf)**	**Effective Angle of Internal Frication, Φ' (degrees)**	**Cohesion (ksf)**	**Adhesion factor**	**Skin Friction Angle, (degrees)**	k-value (pci)	ε_{50}
0 to 13	113	50.6	29	-	-	11	35	-
13 to 18	110	47.6	27	-	-	-		-
18 to 23	122	59.6	-	0.25	0.225	-	20	0.025
23 to 33	120	57.6	32	-	-	11	75	-
33 to 53	125	62.6	34	-	-	11	90	-
53 to 73	118	55.6	30	-	-	11	50	-
73 to 75	126	63.6	-	1.5	1.35	-	500	0.010

The skin Friction Angle, (degrees) reported was based on the assumption the sheet pile wall will consist of smooth steel sheet piling.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations for the cafeteria building addition.

Design Parameters – Compressive Loads

Item	Description
Maximum Net allowable bearing pressure [1]	1,000 psf for the civic building 2,000 psf for the amphitheater
The required embedment below lowest adjacent finished grade for frost protection and protective embedment [2]	12 inches
Minimum width for continuous wall footings	12 inches for thickened slab 16 inches for strip footings
Minimum width for isolated column footings	24 inches
Approximate total settlement [3]	Less than 1 inch
Estimated differential settlement [3]	Up to 1/2 inch between columns and along 40 feet of wall

Ultimate coefficient of sliding friction [4]	0.35

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The maximum net allowable bearing pressure may be increased by 1/3 for transient wind loads.
2. For frost protection and to reduce effects of seasonal moisture variations in subgrade soils. For perimeter footings and footings beneath unheated areas.
3. The actual magnitude of settlement that will occur beneath the foundations will depend upon the variations within the subsurface soil profile, the structural loading conditions and the quality of the foundation excavation. The estimated total and differential settlements listed assume that the foundation-related earthwork and the foundation design are completed in accordance with our recommendations.
4. For uplift resistance, use the weight of the foundation concrete plus the weight of the soil over the plan area of the footings. 110 pounds per cubic foot should be used for the density of the soil above the water table.

Foundation Construction Considerations

The foundation bearing materials should be evaluated at the time of the foundation excavation. This is an essential part of the construction process. The Geotechnical Engineer should use a combination of hand auger borings and dynamic cone penetrometer (DCP) testing to determine the suitability of the bearing materials for the design bearing pressure. DCP testing should be performed to a depth of 3 to 5 feet below the bottom of foundation excavation. Excessively soft, loose, or wet bearing soils should be over excavated to a depth recommended by the Geotechnical Engineer. The excavated soils should be replaced with structural fill or washed, crushed stone (NCDOT No. 57) wrapped in a geotextile fabric (Mirafi 140 N or equivalent). The need for the geotextile fabric with the crushed stone should be determined by the Geotechnical Engineer during construction based on sloughing/caving soils and excavation observations. However, footings could bear directly on the soils after over excavation if approved by the Geotechnical Engineer.

The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at bearing level become excessively disturbed or saturated, the affected soil should be removed prior to placing concrete.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the North Carolina State Building Code (NCBSC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is**

D. Subsurface explorations at this site were extended to a maximum depth of 75 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

LIQUEFACTION

Based on the results of the borings, liquefaction is not expected after the recommended earthwork, relatively low level of ground motions associated with the design earthquake.

FLOOR SLABS

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Approved existing soil or structural fill. [2]
Estimated Modulus of Subgrade Reaction [2]	100 pounds per square inch per inch (psi/in) for point loads
Base Course	4 inches crushed stone (NCDOT ABC)

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Settlement of floor slabs supported on existing fill materials cannot be accurately predicted, but could be larger than normal and result in some cracking. Mitigation measures, as noted in **Existing Fill** within **Earthwork**, are critical to the performance of floor slabs. In addition to the mitigation measures, the floor slab can be stiffened by adding steel reinforcement, grade beams and/or post-tensioned elements.

Floor Slab Construction Considerations

On most project sites, the site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall, etc. As a result, the floor slab subgrade may not be suitable for placement of base stone and concrete and corrective action will be required to repair the damaged areas.

Finished subgrade, within and for at least 5 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. We recommend the area be thoroughly proofrolled. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the

absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

FIGURES

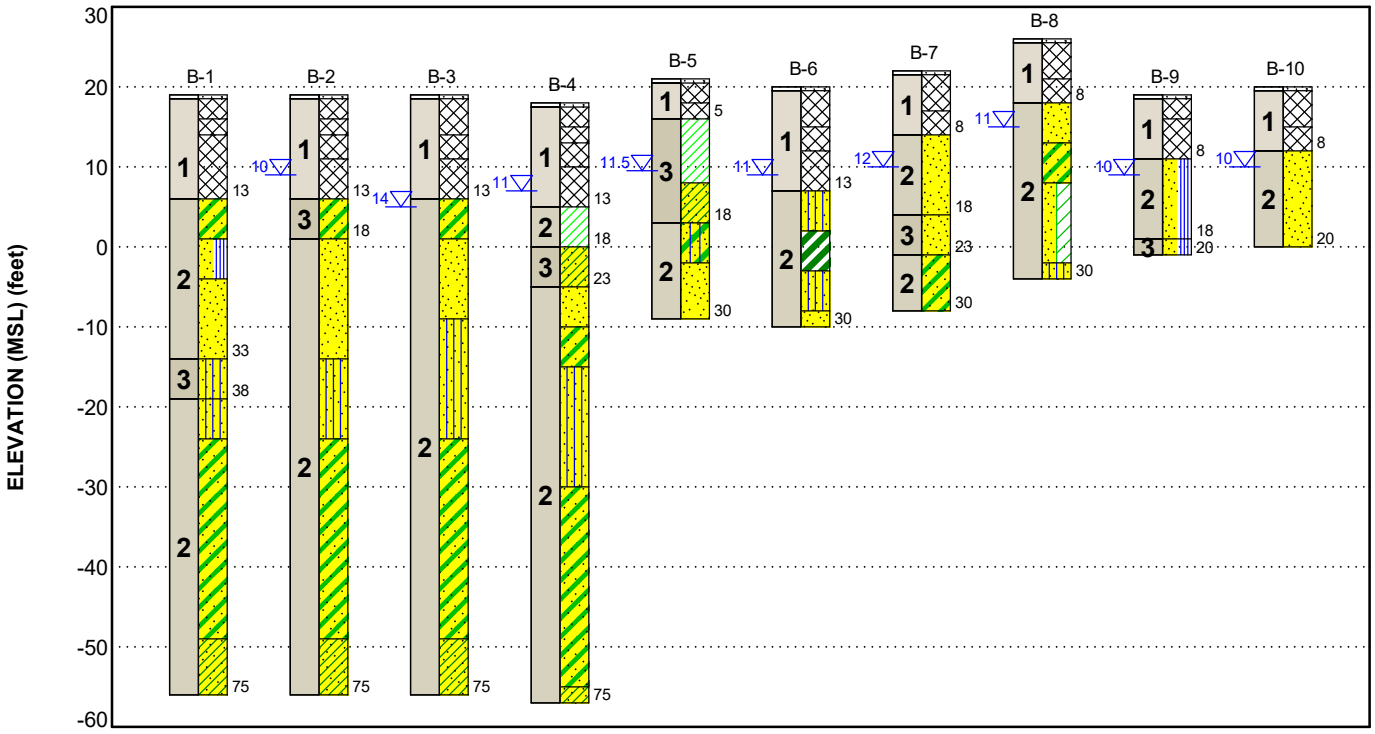
Contents:

Note: All attachments are one page unless otherwise noted.

GEOMODEL

Proposed Town Commons Civic Center ■ Greenville, NC
Terracon Project No. 72215104

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Fill**	Fill consisting of silty sand, poorly graded sand, clayey sand, lean clay, and sandy lean clay
2	**Denser soil**	loose to very dense sand and medium stiff to stiff clay
3	**Looser soil**	Very loose sand and very soft to soft clay

LEGEND

- Topsoil
- Fill
- Clayey Sand
- Poorly-graded Sand with Silt
- Poorly-graded Sand
- Silty Sand
- Sandy Lean Clay
- Lean Clay
- Silty Clayey Sand
- Fat Clay
- Poorly-graded Sand with Clay

▽ First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Borings	Boring Depth (feet)[1]	Location
B-1 through B-4	75	Along bulkhead
B-5 and B-6	30	Near amphitheater
B-7 through B-10	20 to 30	Proposed building footprint

1. Referenced from existing ground surface.

Exploration Location Layout and Elevations: Coordinates of the exploration locations were determined by overlaying the plans provided on aerial photography by referencing common features. The exploration locations were located in the field by Terracon by referencing existing site features and a handheld GPS. Approximate elevations were obtained from publicly available mapping and GoogleEarth Pro. The location and elevations of the exploration locations should be considered accurate only to the degree implied by the means and methods used to define it.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using mud rotary drilling techniques. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural

standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D2488 Standard Practice of Description and Identification of Soils (Visual Manual Method)
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than No. 200 Sieve in Soils by Washing

Detailed results of our laboratory testing can be found in in the **Exploration Results** section and are attached herein. Our laboratory testing program includes examination of soil samples by an engineer. Based on the material's texture and plasticity, we describe and classify soil samples in accordance with the Unified Soil Classification System (USCS).

PHOTOGRAPHY LOG

Photos Taken October 11 and 15, 2021

View of the bulkhead facing west

View of building footprint area facing south east

View of amphitheater facing west

Overview of the site facing north west

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Proposed Town Commons Civic Center ■ Greenville, NC
February 11, 2022 ■ Terracon Project No. 72215104

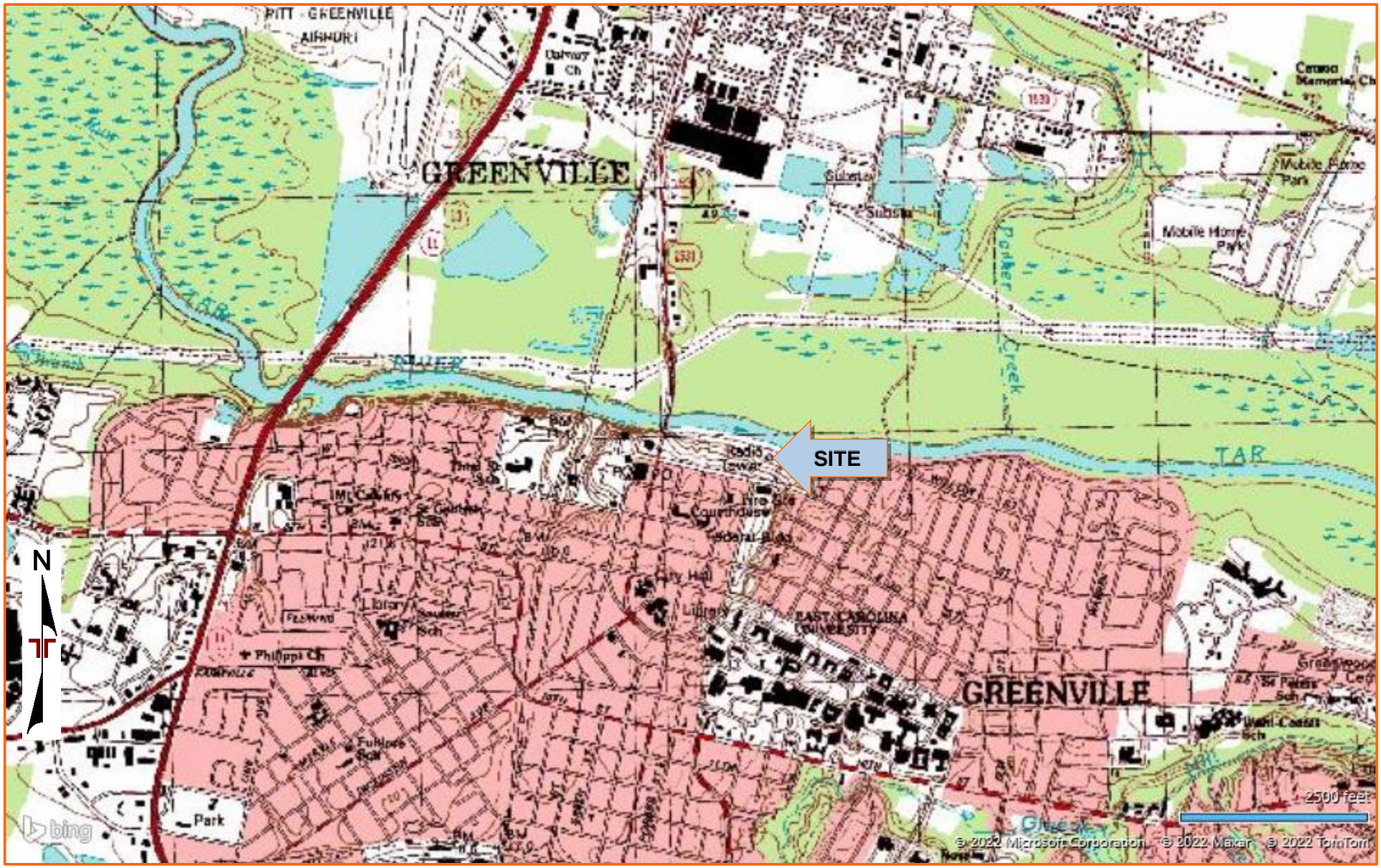


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: GREENVILLE NW, NC (1/1/1998), GREENVILLE NE, NC (1/1/1998), GREENVILLE SW, NC (1/1/1998) and GREENVILLE SE, NC (1/1/1998).

EXPLORATION PLAN

Proposed Town Commons Civic Center ■ Greenville, NC
February 11, 2022 ■ Terracon Project No. 72215104

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6166° Longitude: -77.3724°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
	0.5	18.5+/-	**TOPSOIL**, 6 inches
1	3.0	16+/-	**FILL - SILTY SAND, CLAYEY SAND**, brown
1	5.0	14+/-	**FILL - LEAN CLAY**, light brown with orange mottle
1	13.0	6+/-	**FILL - SILTY SAND, CLAYEY SAND, LEAN CLAY**, peices of red brick, gravel, and glass, black, brown, and light gray
2	18.0	1+/-	**CLAYEY SAND (SC)**, orangish brown, loose
2	23.0	-4+/-	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, loose
2	33.0	-14+/-	**POORLY GRADED SAND (SP)**, brown with orange to grayish brown, loose to medium dense
3	38.0	-19+/-	**SILTY SAND (SM)**, gray, very loose
2	43.0	-24+/-	**SILTY SAND (SM)**, gray, very dense

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
		4-7-7 N=14
5		0-1-2 N=3
		4-5-2 N=7
10		2-4-3 N=7
		2-6-3 N=9
15		
		2-1-3 N=4
20		
		4-10-11 N=21
25		
		2-3-2 N=5
30		
		5-1-1 N=2
35		
		50/3"
40		

WATER LEVEL OBSERVATIONS

WATER CONTENT (%)

ATTERBERG LIMITS: LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-09-2021 | Boring Completed: 12-09-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-1

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6166° Longitude: -77.3724°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2			**CLAYEY SAND WITH SHELL FRAGMENTS (SC)**, micaceous, dark gray, loose to medium dense	45			2-3-5 N=8			
				50			3-2-6 N=8	30.2	31-19-12	37
				55			3-3-3 N=6			
				60			3-4-6 N=10			
				65			2-2-4 N=6			
		68.0	-49+/-							
			SANDY LEAN CLAY (CL), micaceous, dark gray, stiff	70			3-4-6 N=10			
		75.0	-56+/-							
			Boring Terminated at 75 Feet	75			2-3-6 N=9			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-09-2021 | Boring Completed: 12-09-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-2

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6165° Longitude: -77.3713°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
1	0.5	18.5+/-	**TOPSOIL**, 6 inches
1	3.0	16+/-	**FILL - CLAYEY SAND, LEAN CLAY**, brown with trace orange
1	5.0	14+/-	**FILL - POORLY GRADED SAND, LEAN CLAY, CLAYEY SAND**, brown
1	8.0	11+/-	**FILL - LEAN CLAY**, brown with black gravel
1	13.0	6+/-	**FILL - CLAYEY SAND, LEAN CLAY**, brownish gray
3	18.0	1+/-	**CLAYEY SAND (SC)**, brownish gray, very loose
2	33.0	-14+/-	**POORLY GRADED SAND (SP)**, orangish brown with red to grayish brown, medium dense to very dense
2	43.0	-24+/-	**SILTY SAND (SM)**, gray, very dense

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
5		2-3-4 N=7
		3-2-3 N=5
		2-3-6 N=9
10		5-5-3 N=8
		0-1-1 N=2
15		
20		6-13-11 N=24
		5-8-9 N=17
25		
30		8-18-42 N=60
		50/4"
35		
		50/4"
40		

WATER LEVEL OBSERVATIONS: ▽ End of day on 12/9/21

WATER CONTENT (%)

ATTERBERG LIMITS LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-08-2021 | Boring Completed: 12-09-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-2

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6165° Longitude: -77.3713°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2			**CLAYEY SAND WITH SHELL FRAGMENTS (SC)**, dark gray, loose	45			3-4-5 N=9			
				50			2-2-3 N=5			
				55			2-3-5 N=8			
				60			2-3-5 N=8			
				65			2-4-4 N=8			
		68.0	-49+/-	70			2-3-3 N=6			
			SANDY LEAN CLAY (CL), dark gray, medium stiff	75			3-3-4 N=7			
		75.0	-56+/-							
			Boring Terminated at 75 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/9/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-08-2021 | Boring Completed: 12-09-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-3

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6163° Longitude: -77.3700°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
	0.5	18.5+/-	**TOPSOIL**, 6 inches
1	5.0	14+/-	**FILL - CLAYEY SAND**, trace organics, brown to orangish brown
1	8.0	11+/-	**FILL - SILTY SAND, LEAN CLAY**, brown with orangish red
1	13.0	6+/-	**FILL - CLAYEY SAND, LEAN CLAY**, trace organics, red brick peices, dark brownish orange
2	18.0	1+/-	**CLAYEY SAND (SC)**, gray with orange, loose
2	28.0	-9+/-	**POORLY GRADED SAND (SP)**, clay lense, light brown, medium dense
2	43.0	-24+/-	**SILTY SAND (SM)**, dark brown to dark gray, dense to very dense

DEPTH (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5	2-3-5 N=8	18.0		
	4-5-4 N=9	19.1		
	2-3-4 N=7	18.7		
10	2-2-3 N=5	20.1		
15	0-2-3 N=5	22.6	24-13-11	39
20	4-7-9 N=16	20.9		
25	4-5-7 N=12	24.7		
30	24-29-45 N=74	27.5		
35	50-50-50 N=100	28.8		
40	5-18-16 N=34			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-07-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-3

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6163° Longitude: -77.3700°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2			**CLAYEY SAND WITH SHELL FRAGMENTS (SC)**, dark gray, loose to medium dense	45			13-7-8 N=15	32.8		
				50			3-3-4 N=7			
				55			2-2-4 N=6	32.7		
				60			3-3-3 N=6			
				65			3-3-3 N=6	31.9		
				70			3-4-6 N=10			
		68.0	-49+/-							
			SANDY LEAN CLAY (CL), micaceous, trace shell fragments, dark gray, stiff							
		75.0	-56+/-	75			4-4-5 N=9	27.9		
			Boring Terminated at 75 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-07-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-4

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6160° Longitude: -77.3689°

Approximate Surface Elev.: 18 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
	0.5	17.5+/-	**TOPSOIL**, 6 inches
1	3.0	15+/-	**FILL - CLAYEY SAND**, trace organics, brown with orange
1	5.0	13+/-	**FILL - CLAYEY SAND, LEAN CLAY**, orangish brown
1	8.0	10+/-	**FILL - LEAN CLAY, CLAYEY SAND**, gray to brown with orange
1	13.0	5+/-	**FILL - POORLY GRADED SAND, LEAN CLAY**, grayish brown with orange
2	18.0	0+/-	**LEAN CLAY (CL)**, gray, soft to medium stiff
3	23.0	-5+/-	**SANDY LEAN CLAY (CL)**, light gray to dark brown, very soft
2	28.0	-10+/-	**POORLY GRADED SAND (SP)**, noted clay lense, gray, medium dense
2	33.0	-15+/-	**CLAYEY SAND (SC)**, micaceous, dark gray, medium dense
2			**SILTY SAND (SM)**, noted clay lense, gray, very dense

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5			5-6-6 N=12			
			4-5-4 N=9			
			3-4-2 N=6			
10	▽		3-4-6 N=10			
			0-1-3 N=4			
15						
20			2-1-0 N=1			
			4-8-7 N=15			
25						
30			2-3-10 N=13			
			50/4"			
35						
40			40-44-45 N=89			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-06-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-4

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6160° Longitude: -77.3689°

Approximate Surface Elev.: 18 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2			**SILTY SAND (SM)**, noted clay lense, gray, very dense *(continued)*	45			50/1"			
		48.0	-30+/-							
			CLAYEY SAND WITH SHELL FRAGMENTS (SC), micaceous, dark gray, dense to loose	50			39-30-5 N=35			
				55			3-4-5 N=9			
				60			2-3-5 N=8			
				65			2-3-4 N=7			
				70			2-3-4 N=7			
		73.0	-55+/-							
		75.0	**SANDY LEAN CLAY (CL)**, micaceous, with shell fragments, dark gray, stiff -57+/-	75			3-4-6 N=10			
			Boring Terminated at 75 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-06-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-5

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6162° Longitude: -77.3702°

Approximate Surface Elev.: 21 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)		FIELD TEST RESULTS
1	0.5	20.5+/-	**TOPSOIL**, 6 inches	
1	3.0	18+/-	**FILL - CLAYEY SAND, LEAN CLAY**, trace gravel, brown with orange	3-4-3 N=7
1	5.0	16+/-	**FILL - SANDY LEAN CLAY**, trace gravel, brownish gray with orange	2-4-6 N=10
3			**LEAN CLAY (CL)**, grayish brown, soft to medium stiff	2-2-3 N=5
3				2-1-3 N=4
3	13.0	8+/-		
3			**SANDY LEAN CLAY (CL)**, brownish gray, very soft	WOH
3	18.0	3+/-		
2			**SILTY CLAYEY SAND (SC-SM)**, brownish gray, loose	1-1-3 N=4
2	23.0	-2+/-		
2			**POORLY GRADED SAND (SP)**, noted clay lense, orangish brown, medium dense	4-7-8 N=15
2	30.0	-9+/-		3-11-17 N=28
			Boring Terminated at 30 Feet	

DEPTH (Ft.): 5, 10, 15, 20, 25, 30

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

WATER CONTENT (%)

ATTERBERG LIMITS: LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.
WOH= Weight of Hammer

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/9/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-08-2021 | Boring Completed: 12-08-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-6

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6161° Longitude: -77.3699°

Approximate Surface Elev.: 20 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
1	0.5	19.5+/-	**TOPSOIL**, 6 inches
1	5.0	15+/-	**FILL - CLAYEY SAND, LEAN CLAY**, brown
1	8.0	12+/-	**FILL - SANDY LEAN CLAY**, brown with orange mottle
1	13.0	7+/-	**FILL - CLAYEY SAND, LEAN CLAY**, trace metal and glass, black and gray
2	18.0	2+/-	**SILTY SAND (SM)**, dark grayish brown, loose
2	23.0	-3+/-	**FAT CLAY (CH)**, noted poorly graded sand lense, light gray, medium stiff to stiff
2	28.0	-8+/-	**SILTY SAND (SM)**, clay lense, orangish brown, loose
2	30.0	-10+/-	**POORLY GRADED SAND (SP)**, orangish brown, medium dense
			Boring Terminated at 30 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5			5-8-5 N=13			
			3-3-4 N=7			
			1-1-3 N=4			
10	▽		4-3-5 N=8			
			2-2-2 N=4			
15						
			0-3-5 N=8			
20						
			1-3-4 N=7			
25						
			2-4-6 N=10			
30						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-07-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-7

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6157° Longitude: -77.3693°

Approximate Surface Elev.: 22 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
1	0.5	21.5+/-	**TOPSOIL**, 6 inches
			FILL - CLAYEY SAND, brownish gray with orange mottle
	5.0	17+/-	
			FILL - POORLY GRADED SAND, CLAYEY SAND, LEAN CLAY, orange
	8.0	14+/-	
2			**POORLY GRADED SAND (SP)**, noted clay lense, dark brownish orange, loose to medium dense
	18.0	4+/-	
3			**POORLY GRADED SAND (SP)**, black to orangish brown, very loose
	23.0	-1+/-	
2			**CLAYEY SAND (SC)**, dark brown with trace orange and black, medium dense
	30.0	-8+/-	
			Boring Terminated at 30 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5			2-3-5 N=8			
			2-2-4 N=6			
			4-7-8 N=15			
10	▽		5-4-4 N=8			
			1-3-4 N=7			
15						
20			2-1-2 N=3			
			2-4-8 N=12			
25						
30			5-10-8 N=18			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-07-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-8

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6155° Longitude: -77.3690°

Approximate Surface Elev.: 26 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
	0.5	25.5+/-	**TOPSOIL**, 6 inches
1	5.0	21+/-	**FILL - SANDY LEAN CLAY**, trace organics, brown with orange and red specks
1	8.0	18+/-	**FILL - CLAYEY SAND, SILTY SAND, SANDY LEAN CLAY**, trace shell, brown with orange and black
2	13.0	13+/-	**POORLY GRADED SAND (SP)**, noted clay lense, dark brown, loose
2	18.0	8+/-	**CLAYEY SAND (SC)**, orangish brown, loose
2	28.0	-2+/-	**POORLY GRADED SAND WITH CLAY (SP-SC)**, orangish brown, loose to medium dense
	30.0	-4+/-	**SILTY SAND (SM)**, orangish brown, medium dense
			Boring Terminated at 30 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
5			2-2-3 N=5	24.6		
			2-2-2 N=4	20.4		
			3-3-2 N=5	20.0		
10	▽		1-2-3 N=5	21.0		
15			3-4-4 N=8	25.0		
20			3-4-6 N=10	27.7		
25			2-3-4 N=7	27.7	28-17-11	9
30			2-2-9 N=11	35.3		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/7/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-06-2021 | Boring Completed: 12-06-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-9

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6158° Longitude: -77.3691°

Approximate Surface Elev.: 19 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.5	18.5+/-							
		TOPSOIL, 6 inches								
		FILL - SANDY LEAN CLAY, brown					5-6-5 N=11			
		3.0	16+/-							
1		**FILL - SILTY SAND, CLAYEY SAND, LEAN CLAY**, trace gravel, brown with orange and black		5			1-2-1 N=3			
							0-0-2 N=2			
		8.0	11+/-							
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, noted clay lense, orangish brown, very loose to loose		10	▽		2-2-2 N=4	25.9	NP	9
				15			2-2-3 N=5			
		18.0	1+/-							
3		**POORLY GRADED SAND WITH SILT (SP-SM)**, orangish brown, very loose					0-0-3 N=3			
		20.0	-1+/-	20						
		Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/8/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-07-2021 | Boring Completed: 12-07-2021

Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

BORING LOG NO. B-10

PROJECT: Proposed Town Commons Civic Center

CLIENT: The East Group, P.A.
Greenville, NC

SITE: First Street
Greenville, NC

LOCATION See Exploration Plan

Latitude: 35.6156° Longitude: -77.3689°

Approximate Surface Elev.: 20 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
	0.5	19.5+/-	**TOPSOIL**, 6 inches
1			**FILL - CLAYEY SAND**, brown with orange mottle
	5.0	15+/-	
			FILL - POORLY GRADED SAND, dark red
	8.0	12+/-	
2			**POORLY GRADED SAND (SP)**, orangish brown to brown, loose
	20.0	0+/-	
			Boring Terminated at 20 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
5		4-4-4 N=8
		2-3-4 N=7
		5-3-4 N=7
10		1-2-3 N=5
15		1-2-2 N=4
20		1-2-4 N=6

WATER LEVEL OBSERVATIONS: ▽ at 10 ft

WATER CONTENT (%)

ATTERBERG LIMITS LL-PL-PI

PERCENT FINES

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite chips after delayed water levels were measured.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *End of day on 12/7/21*

Terracon
314 Beacon Dr
Winterville, NC

Boring Started: 12-06-2021 | Boring Completed: 12-06-2021

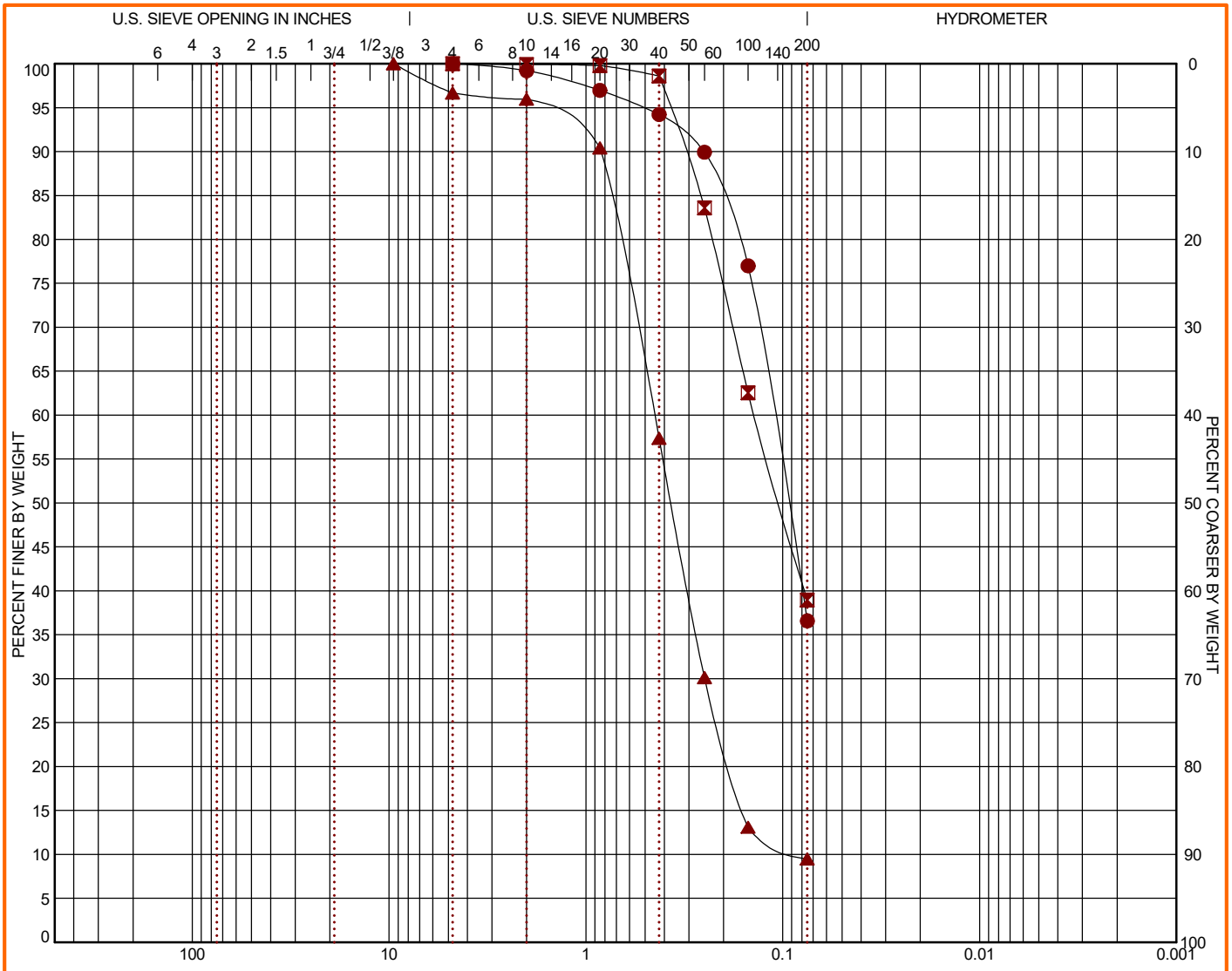
Drill Rig: Rig:448/Geoprobe | Driller: Willie Duggins

Project No.: 72215104

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 72215104 PROPOSED TOWN COM.GPJ TERRACON_DATATEMPLATE.GDT 2/11/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-1	48.5 - 50	0.0	0.0	63.4		36.6		SC
⊠	B-3	13.5 - 15	0.0	0.0	61.0		39.0		SC
▲	B-8	23.5 - 25	0.0	3.3	87.2		9.5		SP-SC

GRAIN SIZE	●	⊠	▲
D_{60}	0.112	0.139	0.449
D_{30}			0.249
D_{10}			0.083

COEFFICIENTS	●	⊠	▲
C_C			1.67
C_U			5.43

●		⊠		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#4	100.0	#4	100.0	3/8"	100.0
#10	99.2	#10	99.91	#4	96.67
#20	96.97	#20	99.77	#10	95.96
#40	94.22	#40	98.6	#20	90.4
#60	89.93	#60	83.59	#40	57.37
#100	76.99	#100	62.53	#60	30.13
#200	36.58	#200	38.95	#100	13.1
				#200	9.49

SOIL DESCRIPTION	
●	CLAYEY SAND with SHELL FRAGMENTS (SC)
⊠	CLAYEY SAND (SC)
▲	POORLY GRADED SAND with CLAY (SP-SC)

REMARKS	
●	
⊠	
▲	

PROJECT: Proposed Town Commons Civic Center

SITE: First Street
Greenville, NC

Terracon
314 Beacon Dr
Winterville, NC

PROJECT NUMBER: 72215104

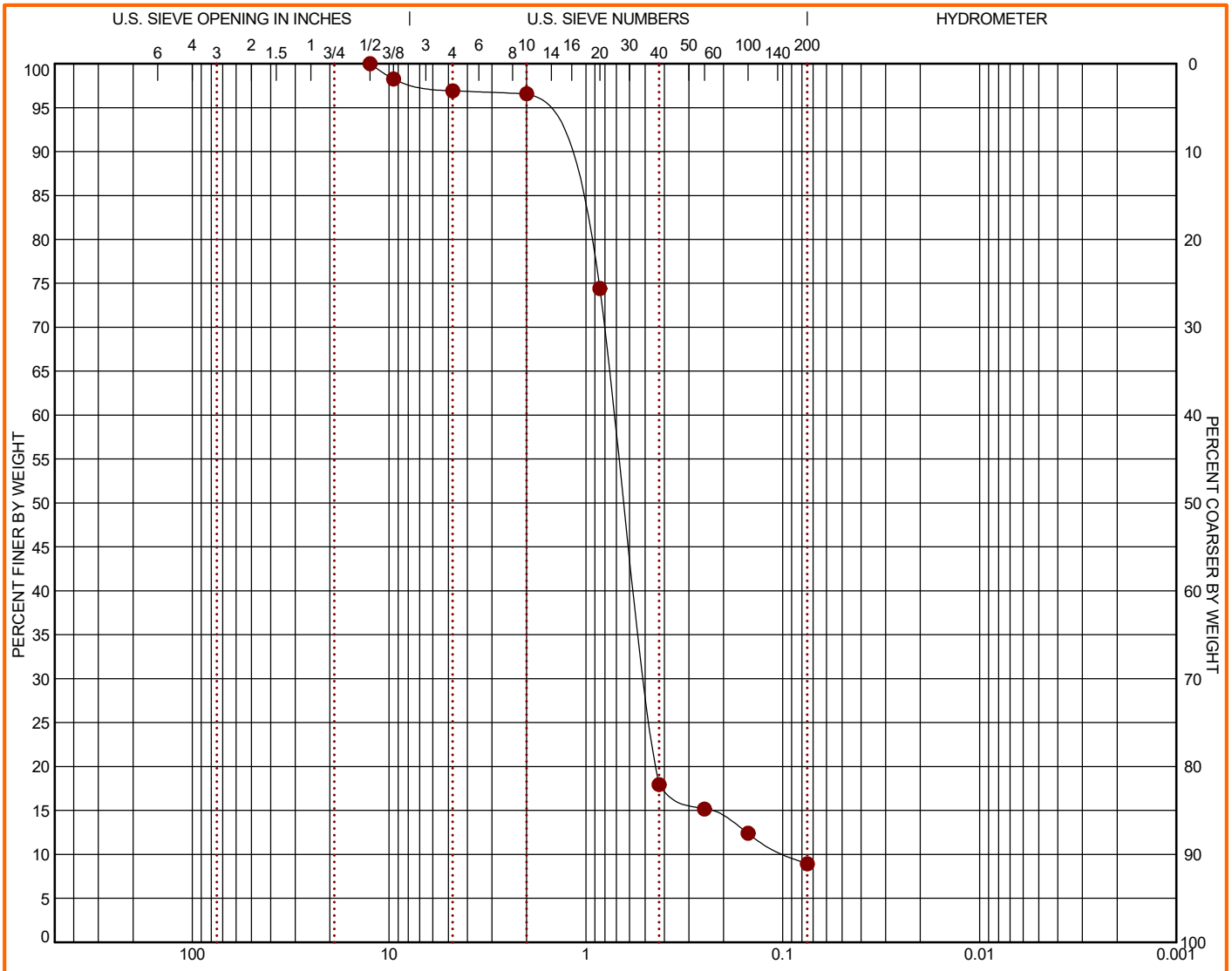
CLIENT: The East Group, P.A.
Greenville, NC

GRAIN SIZE: USCS 1 72215104 PROPOSED TOWN COM.GPJ TERRACON_DATATEMPLATE.GDT 2/10/22

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-9	8.5 - 10	0.0	3.1	88.0		8.9		SP-SM

GRAIN SIZE			
	●		
D_{60}	0.712		
D_{30}	0.493		
D_{10}	0.093		

COEFFICIENTS			
	●		
C_C	3.67		
C_U	7.67		

● Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
1/2"	100.0				
3/8"	98.26				
#4	96.91				
#10	96.58				
#20	74.41				
#40	17.95				
#60	15.16				
#100	12.41				
#200	8.93				

SOIL DESCRIPTION
● POORLY GRADED SAND with SILT (SP-SM)

REMARKS
●

PROJECT: Proposed Town Commons Civic Center

SITE: First Street
Greenville, NC

Terracon
314 Beacon Dr
Winterville, NC

PROJECT NUMBER: 72215104

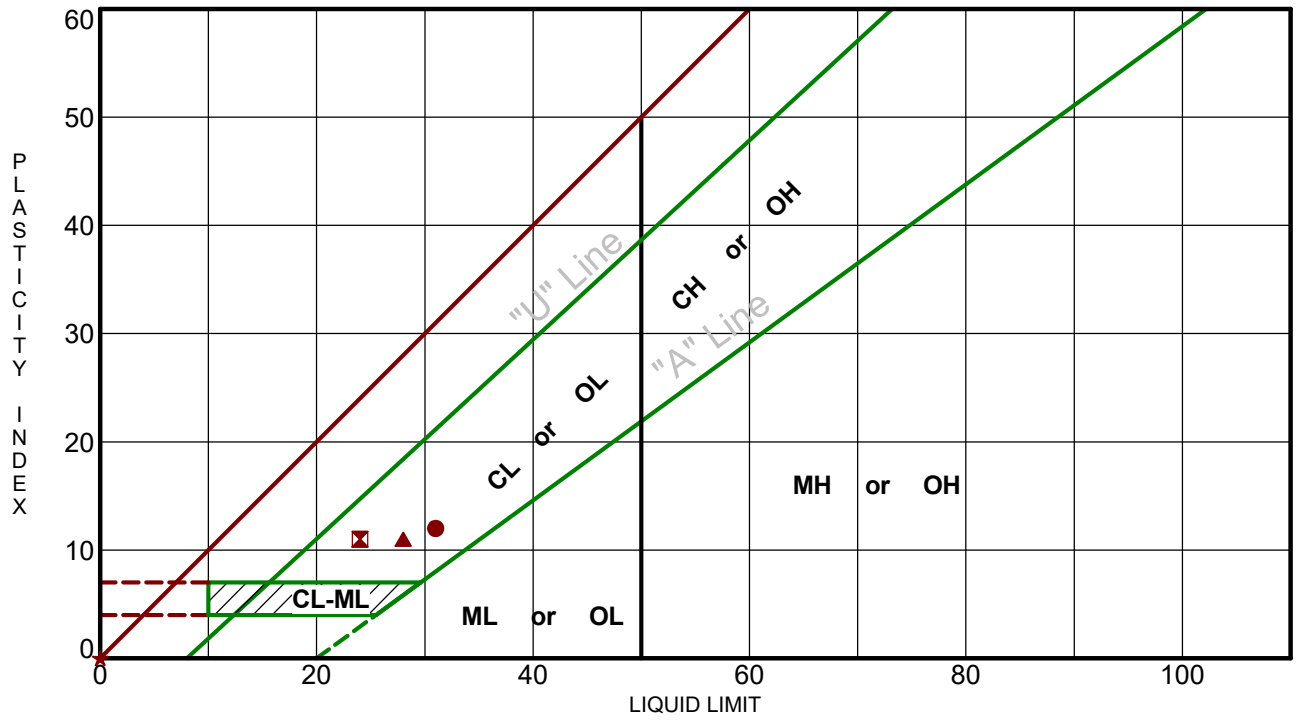
CLIENT: The East Group, P.A.
Greenville, NC

GRAIN SIZE: USCS 1 72215104 PROPOSED TOWN COM.GPJ TERRACON_DATATEMPLATE.GDT 2/10/22

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth	LL	PL	PI	Fines	USCS	Description
●	B-1	48.5 - 50	31	19	12	36.6	SC	CLAYEY SAND with SHELL FRAGMENTS
⊠	B-3	13.5 - 15	24	13	11	39.0	SC	CLAYEY SAND
▲	B-8	23.5 - 25	28	17	11	9.5	SP-SC	POORLY GRADED SAND with CLAY
★	B-9	8.5 - 10	NP	NP	NP	8.9	SP-SM	POORLY GRADED SAND with SILT

PROJECT: Proposed Town Commons Civic Center

SITE: First Street
Greenville, NC

Terracon
314 Beacon Dr
Winterville, NC

PROJECT NUMBER: 72215104

CLIENT: The East Group, P.A.
Greenville, NC

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
East Carteret High School Additions ■ Beaufort, NC
Terracon Project No. 72215115

Terracon GeoReport

SAMPLING	WATER LEVEL	FIELD TESTS
Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [$Cc<1$ or $Cc>3.0$] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [$Cc<1$ or $Cc>3.0$] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

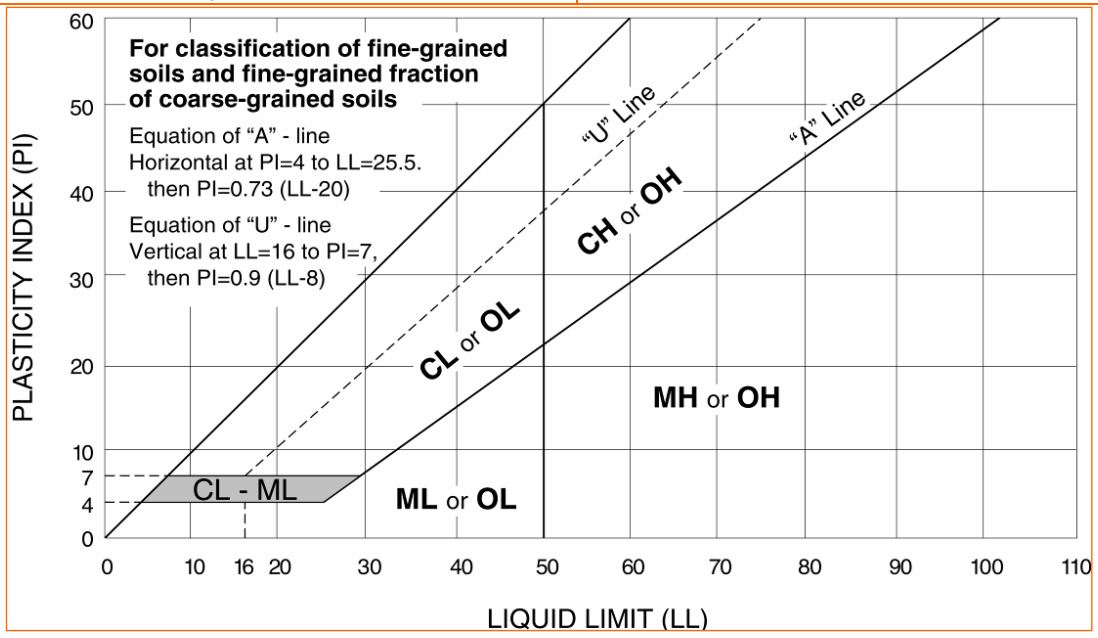
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



APPENDIX

C

PERMITS

- DWR 401 – Riparian Buffer Authorization Certificate with Additional Conditions
  DWR #20240417 v2
  Dated January 8, 2025

- USACE – Nationwide Permit 3 - Maintenance
  Dated February 25, 2022

- USACE – Regional General Permit (RGP)
  Permit #197800056
  Dated January 1, 2022

JOSH STEIN
Governor
D. REID WILSON
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

January 8, 2025

DWR # 20240417 v2
Pitt County

City of Greenville
Mark Nottingham
2000 Cedar Lane
Greenville, NC 27858

Delivered via email to: mnottingham@greenvillenc.gov

Subject: **APPROVAL of TAR-PAMLICO RIPARIAN BUFFER AUTHORIZATION CERTIFICATE WITH ADDITIONAL CONDITIONS**

Project: **City of Greenville Town of Common s Bulkhead and Esplanade Project,**
Location: 106 East First Street, Greenville NC.

Dear Mr. Nottingham:

You have our approval for the impacts listed below for the purpose described in your application dated January 8, 2025, and received by the Division of Water Resources (Division) on November 4, 2024. These impacts are covered by the Tar Pamlico Buffer Rules and the conditions listed below. This Buffer Authorization does not relieve the permittee of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to, Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and/or Stormwater regulations.

The following impacts are hereby approved, provided that all of the Conditions listed below, and all the conditions of the Tar- Pamlico Buffer Rules are met. No other impacts are approved, including incidental impacts. [15A NCAC 02B.0611(b)(2)]

Type of Impact	Amount Approved (units) Permanent	Amount Approved (units) Temporary
Buffers – Zone 1		
Site 1 / Tar River / Bulkhead Maintenance	21, 374 (square feet)	0 (square feet)

Buffers – Zone 2		
Site 1 / Tar River / Bulkhead Maintenance	8235 (square feet)	0 (square feet)

This approval is for the purpose and design described in your application. The plans and specifications for this project are incorporated by reference as part of this Authorization Certificate. If you change your project, you must notify the Division, and you may be required to submit a new application package. If the property is sold, the new owner must be given a copy of this Authorization Certificate and is responsible for complying with all conditions. [15A NCAC 02B.0611(b)(2)]

If you are unable to comply with any of the conditions below, you must notify the Washington Regional Office within 24 hours (or the next business day if a weekend or holiday) from the time the permittee becomes aware of the circumstances.

The permittee shall report to the Washington Regional Office any noncompliance with the conditions of this Authorization Certificate and/or any violation of state regulated riparian buffer rules [15A NCAC 02B.0734]. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the applicant became aware of the circumstances.

Additional Conditions:

1. No impacts shall occur to Zone 1 of the protected riparian buffers [except for uses and activities designated as “exempt” within 15A NCAC 02B .0734(11).
2. This authorization exempts the Permittee from meeting Condition II.9 in the attached General Certification #4134 for the placement of in-stream structure material into Tar-Pamlico. The Permittee shall take all reasonable measures to construct in-stream structures while keeping heavy equipment out of the stream channel. Only equipment that is being used to install structures may enter the stream channel. This exemption does not authorize the use of equipment within the stream channel for any other purpose such as a haul road, access, streambank reshaping, etc. Equipment shall access the stream at the closest point possible to reduce impacts to the stream bed. Most of the stream flow shall be diverted around work areas along the stream banks such as toe protection and bank sloping. All reasonable steps must be taken to limit the amount of disturbance in the channel and therefore reduce downstream turbidity during construction. This exemption does not relieve the Permittee of meeting stream standards as indicated in 15A NCAC 02B. [15A NCAC 02H .0506(b)(1)]

3. The designer or his designer shall supervise the installation of in-stream structures. [15A NCAC 02H .0506(b)(1) and (2)]

4. The Permittee shall replant the vegetation within temporarily disturbed areas located within 30 feet of the shoreline or most landward limit of normal high-water level associated with this project in an “in kind” manner immediately following construction. (Example: Disturbed areas with pre-existing grassed lawns must be replanted with grass. Disturbed areas with pre-existing trees or woody vegetation must be replanted with trees and woody vegetation. Disturbed areas with pre-existing forest vegetation must be replanted with forest vegetation including at least two different native hardwood tree species at a density sufficient to provide 260 trees per acre

at maturity. This density can usually be achieved by planting approximately 436 (10 x 10 spacing) to 681 (8 x 8 spacing) trees per acre.) Replanting of trees/shrubs/forest must be completed by the first subsequent planting season (November 1 through March 30). Note, that if the tree plantings do not survive, they will need to be replaced such that the density is sufficient to provide 260 trees per acre at maturity. [15A NCAC 02H .0507(c), 15A NCAC 02H .0506(b)(3), and Table of Use for each buffer rule (temp roads, temporary): [15A NCAC 02B.0734(11) (ee)]

This approval and its conditions are final and binding unless contested. [G.S. 143-215.5] Upon the presentation of proper credentials, the Division may inspect the property.

This Authorization Certificate can be contested as provided in Chapter 150B of the North Carolina General Statutes by filing a Petition for a Contested Case Hearing (Petition) with the North Carolina Office of Administrative Hearings (OAH) **within sixty (60) calendar days**. Requirements for filing a Petition are set forth in Chapter 150B of the North Carolina General Statutes and Title 26 of the North Carolina Administrative Code. Additional information regarding requirements for filing a Petition and Petition forms may be accessed at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000.

A party filing a Petition must serve a copy of the Petition on:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

If the party filing the Petition is not the permittee, then the party must also serve the recipient of the Authorization Certificate in accordance with N.C.G.S 150B-23(a).

This Authorization Certificate neither grants nor affirms any property right, license, or privilege in any lands or waters, or any right of use in any waters. This Authorization Certificate does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person, nor does it create any prescriptive right or any right of priority regarding any usage of water. This Authorization Certificate shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water use. No consumptive user is deemed by virtue of this Authorization Certificate to possess any prescriptive or other right of priority with respect to any other consumptive user.

This Authorization shall expire when the corresponding 401 Water Quality Certification Approval DWR#20240417 v2 expires on March 14, 2026.

This letter completes the Division's review under the Tar- Pamlico Riparian Buffer Rules as described in 15A NCAC 02B.0734. Please contact Paul Nyarko at 252-948-3845 or paul.nyarko@deq.nc.gov if you have any questions or concerns.

Sincerely,

Robert Tankard

Robert Tankard, Assistant Regional Supervisor
Water Quality Regional Operation Section
Division of Water Resources, NCDEQ
Washington Regional Office

Electronic cc: Doug Huggett, dhuggett@moffattnichol.com
Billy Standridge, USACE Washington Regulatory Field Office

DWR 401 & Buffer Permitting Branch electronic file

Laserfiche

WETLAND/BUFFER
APPROVED
NORTH CAROLINA ENVIRONMENTAL
MANAGEMENT COMMISSION
DIVISION OF WATER RESOURCES

DATE 01/08, 20 25
DWR Permit No. 20240417 v2

NOTE:

TERRACON CONDUCTED THE GEOTECHNICAL ENGINEERING REPORT "TOWN COMMONS CIVIC CENTER AND BULKHEAD GREENVILLE, PITT COUNTY, NORTH CAROLINA" DATED FEBRUARY 11, 2022.

LEGEND:

B-# APPROXIMATE BORING LOCATION (SEE NOTE)

N

60' 0' 60' 120'
SCALE: 1"=60'

ISSUED FOR PERMIT
ISSUED: 2024-03-xx
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALES SHOWN BASED ON 24"x36" DRAWING

Greenville
NORTH CAROLINA

0	ISSUED FOR PERMIT	2024-03-	MAP
Mark	Description	Date	App'r

GREENVILLE TOWN COMMONS & ESPLANADE PROJECT

BORING LOCATION SITE PLAN

Designed by: J. SWYERS		Date: 2024-03-	Rev. 0
Dwn by: VNM	Ckd by: TRR	M&N Project No. 221315-02	
Reviewed by: M. PIRRELLO		Drawing code:	
Submitted by: MARK PIRRELLO MOFFATT & NICHOL		Drawing Scale: AS SHOWN	
		Plot scale: 1:1 (D SHEET)	

moffatt & nichol
4700 FALLS OF NEUSE RD, SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE NO. F-0105

THE EAST GROUP
324 EVANS ST
GREENVILLE, NC 27834
252-758-3746
NC ENGINEERING FIRM LICENSE NO. C-0206
NC LANDSCAPE FIRM LICENSE NO. C-427

SEAL

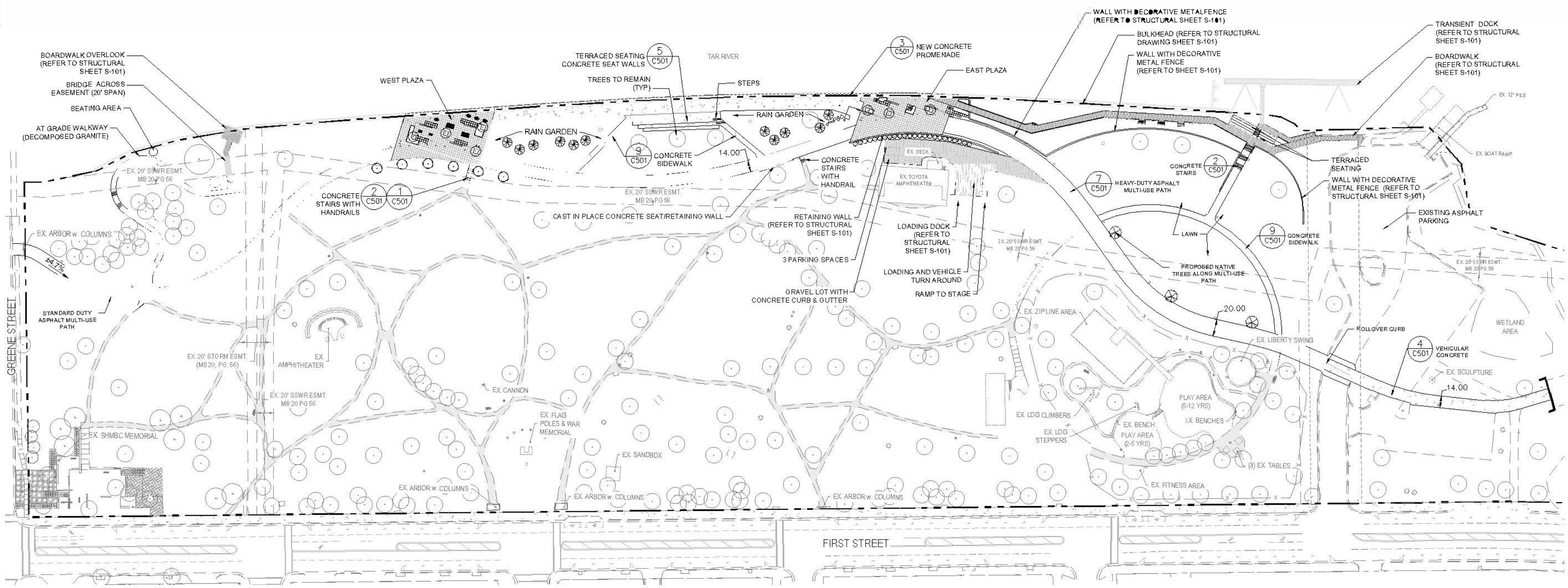
SEAL

Sheet
Reference No.
B-101
INDEX: 9 OF 33

File: Q:\RA\221315-02\20 CADD_Active_Permit\221315-02B-101 ; Plotted: 3/6/2024 11:27 AM by MORGAN, NEKOL ; Saved: 3/4/2024 3:47 PM by NMORGAN

WETLAND/BUFFER
APPROVED
NORTH CAROLINA ENVIRONMENTAL
MANAGEMENT COMMISSION
DIVISION OF WATER RESOURCES

DATE 01/08, 20 25
DWR Permit No. 20240417 v2



SCALE 1"=60'

Greenville NORTH CAROLINA

GREENVILLE TOWN COMMONS & ESPLANADE PROJECT

CIVIL SITE PLAN

M&N Project No. 221315-02

4700 FALLS OF NEUSE RD, SUITE 300 RALEIGH, NC 27609 919-781-4626 NC FIRM LICENSE NO. F-0105

moffatt & nichol

324 EVANS ST GREENVILLE, NC 27834 252-758-3746 NC ENGINEERING FIRM LICENSE NO. C-0206 NC LANDSCAPE FIRM LICENSE NO.

THE EAST GROUP

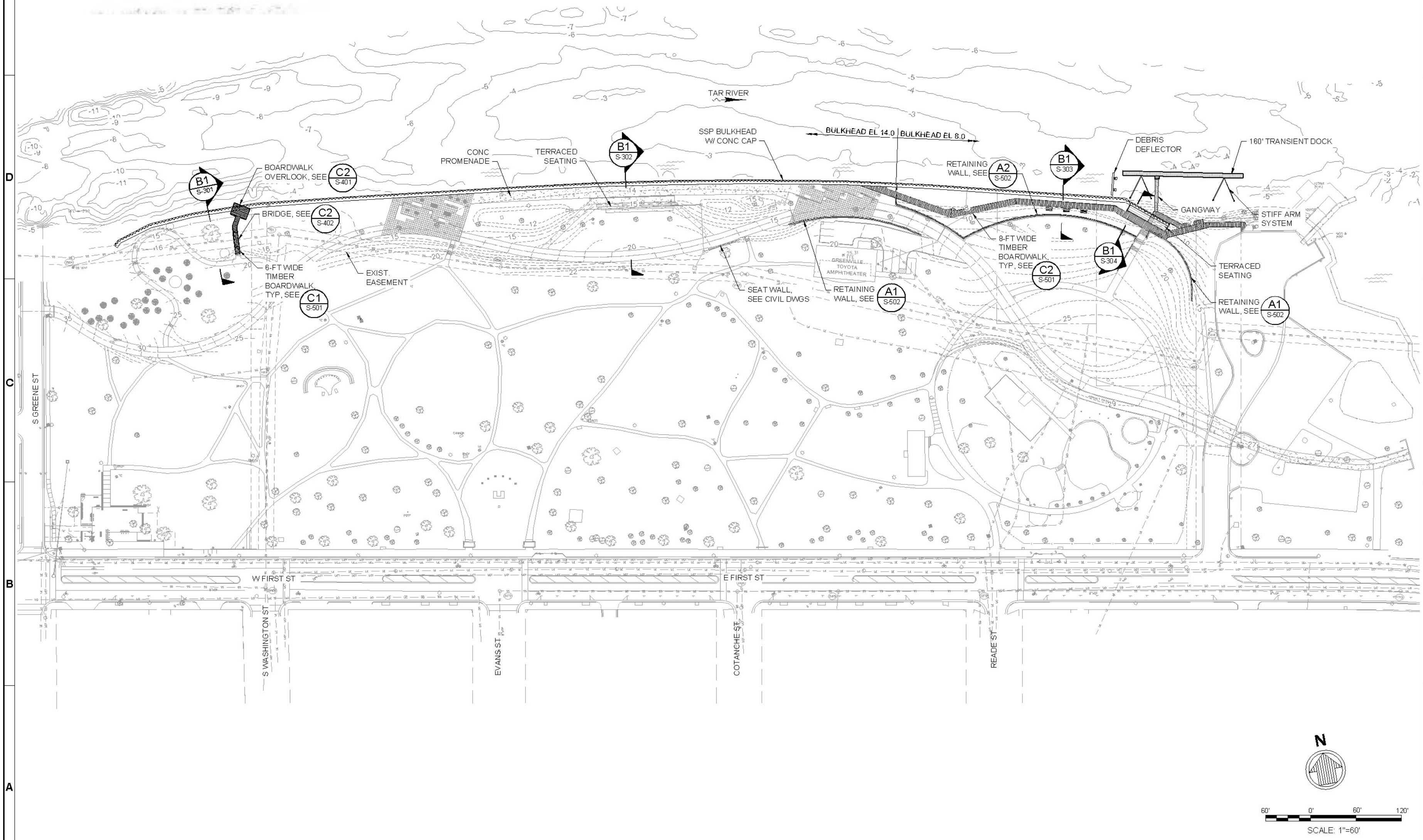
Submitted by: MARK PIRRELLO MOFFATT & NICHOL

ISSUED FOR PERMIT
ISSUED: 2024-02-DD
NOT TO BE USED FOR CONSTRUCTION

Sheet Reference No.
C-101
INDEX 19 OF 33

DRAWING SCALES SHOWN BASED ON 24"x36" DRAWING

WETLAND/BUFFER
APPROVED
NORTH CAROLINA ENVIRONMENTAL
MANAGEMENT COMMISSION
DIVISION OF WATER RESOURCES
DATE 01/08, 20 25
DWR Permit No. 20240417 v2



ISSUED FOR PERMIT
ISSUED: 2024-03-xx
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALES SHOWN BASED ON 24"x36" DRAWING

Greenville NORTH CAROLINA

Mark	Description	Date	App
0	ISSUED FOR PERMIT	2024-03-	

GREENVILLE TOWN COMMONS & ESPLANADE PROJECT

STRUCTURAL PLAN

Designed by: J. SWYERS	Date: 2024-03-	Rev. 0
Dwn by: VNM / Ckd by: TRR	M&N Project No. 221315-02	
Reviewed by: M. PIRRELLO	Drawing code:	
Submitted by: MARK PIRRELLO MOFFATT & NICHOL	Drawing Scale: AS SHOWN / Plot scale: 1:1 (D SHEET)	

moffatt & nichol
4700 FALLS OF NEUSE RD, SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE NO. F-0105

THE EAST GROUP
324 EVANS ST
GREENVILLE, NC 27834
252-758-3746
NC ENGINEERING FIRM LICENSE NO. C-0206
NC LANDSCAPE FIRM LICENSE NO. C-427

SEAL

SEAL

Sheet Reference No.
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Nationwide Permit 3
Maintenance

Effective Date: February 25, 2022 / Expiration Date: March 14, 2026
Authority: Sections 10 and 404

(a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP also authorizes the removal of previously authorized structures or fills. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project. This NWP also authorizes the removal of accumulated sediment and debris within, and in the immediate vicinity of, the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.). The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built but cannot extend farther than 200 feet in any direction from the structure. This 200-foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization.

(c) This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Authorities: Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (Sections 10 and 404))

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act Section 404(f) exemption for maintenance.

GENERAL CONDITIONS

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. **Navigation.**

(a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee’s expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. **Aquatic Life Movements.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. **Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. **Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. **Shellfish Beds.** No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. **Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. **Water Supply Intakes.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. **Adverse Effects from Impoundments.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. **Management of Water Flows.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. **Fills Within 100-Year Floodplains.** The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. **Equipment.** Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. **Soil Erosion and Sediment Controls.** Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. **Removal of Structures and Fills.** Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. **Proper Maintenance.** Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. **Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. **Wild and Scenic Rivers.**

(a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. **Tribal Rights.** No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. **Endangered Species.**

(a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be

necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non- Federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have “no effect” on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the “take” of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with “incidental take” provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word “harm” in the definition of “take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre- construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their worldwide Web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. **Migratory Birds and Bald and Golden Eagles**. The permittee is responsible for ensuring that an action authorized by NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. **Historic Properties.**

(a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR

800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

(d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. **Discovery of Previously Unknown Remains and Artifacts.** Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. **Designated Critical Resource Waters.** Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 5258 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

23. **Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (*i.e.,* on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the

waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee- responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

(6) Compensatory mitigation requirements (*e.g.,* resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to an herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. **Safety of Impoundment Structures.** To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. **Water Quality.**

(a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFF 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

(b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

(c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. **Coastal Zone Management.** In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. **Regional and Case-By-Case Conditions.** The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. **Use of Multiple Nationwide Permits.** The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

(a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

(b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

29. **Transfer of Nationwide Permit Verifications.** If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

_____

(Date)

30. **Compliance Certification.** Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. **Activities Affecting Structures or Works Built by the United States.** If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a ‘‘USACE project’’), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. **Pre-Construction Notification.**

(a) *Timing.* Where required by the terms of the NWP, the permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is ''no effect'' on listed species or ''no potential to cause effects'' on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the pr set forth in 33 CFR 330.5(d)(2).

(b) *Contents of Pre-Construction Notification:* The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4)

(i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

(ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse

environmental effects of the proposed linear project and does not change those non-PCN NWP activities into NWP PCNs.

(iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans).

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate.

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act.

(8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act.

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ‘‘study river’’ for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the ‘‘study river’’ (see general condition 16); and

(10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a

written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

(c) *Form of Pre-Construction Notification:* The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) *Agency Coordination:*

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for:

(i) All NWP activities that require pre-construction notification and result in the loss of greater than 1⁄2-acre of waters of the United States;

(ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and

(iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so, contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre- construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

DISTRICT ENGINEER'S DECISION

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the single and complete crossings of waters of the United States that require PCNs to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings of waters of the United States authorized by an NWP. If an applicant requests a waiver of an applicable limit, as provided for in NWPs 13, 36, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by an NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters. The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with

the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure that the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either:

(a) That the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit;

(b) that the activity is authorized under the NWP subject to the applicant’s submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or

(c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

FURTHER INFORMATION

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

DEFINITIONS

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term ‘‘discharge’’ means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water’s surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National

Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance but are still reasonably foreseeable.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non- tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of ‘‘open waters’’ include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has surface water flowing continuously year-round during a typical year.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre- construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: Re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may

consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term ''single and complete project'' is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term ''single and complete project'' is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of ''independent utility''). Single and complete non-linear projects may not be ''piecemealed'' to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized jurisdictional stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no

longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: (1) Held in trust by the United States for the benefit of any Indian tribe or individual; or (2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a ‘‘water of the United States.’’ If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a sing e aquatic unit (see 33 CFR 328.4(c)(2)).

REGIONAL CONDITIONS:

The following Regional Conditions have been approved by the Wilmington District for the Nationwide Permits (NWPs) published in the January 13, 2021, and December 27, 2021, *Federal Register* (86 FR 2744 and 86 FR 73522) announcing the reissuance of 52 existing (NWPs) and five new NWPs, as well as the reissuance of NWP general conditions and definitions with some modifications.

A. EXCLUDED WATER AND/OR AREAS

The Corps has identified waters that will be excluded from the use of all NWP's during certain timeframes. These waters are:

1. **Anadromous Fish Spawning Areas.** Work in waters of the U.S. designated by either the North Carolina Division of Marine Fisheries (NCDMF) or the North Carolina Wildlife Resources Commission (NCWRC) as anadromous fish spawning areas are prohibited from February 15th through June 30th, without prior written approval from the Corps and the appropriate wildlife agencies (NCDMF, NCWRC and/or the National Marine Fisheries Service (NMFS)). Work in waters of the U.S. designated by NCWRC as primary nursery areas in inland waters are prohibited from February 15th through September 30th, without prior written approval from the Corps and the appropriate wildlife agencies. Work in waters of the U.S. designated by NCDMF as primary nursery areas shall be coordinated with NCDMF prior to being authorized by this NWP. Coordination with NCDMF may result in a required construction moratorium during periods of significant biological productivity or critical life stages.

2. **Trout Waters Moratorium.** Work in waters of the U.S. in the designated trout watersheds of North Carolina are prohibited from October 15th through April 15th without prior written approval from the NCWRC, or from the Eastern Band of Cherokee Indians (EBCI) Fisheries and Wildlife Management (FWM) office if the project is located on EBCI trust land. (See Section C.3. below for information on the designated trout watersheds).

3. **Sturgeon Spawning Areas.** No in-water work shall be conducted in waters of the U.S. designated by the National Marine Fisheries Service as Atlantic sturgeon critical habitat from February 1st through June 30th. No in-water work shall be conducted in waters of the U.S. in the Roanoke River designated as Atlantic sturgeon critical habitat from February 1st through June 30th, and August 1st through October 31st, without prior written approval from NMFS.

4. **Submerged Aquatic Vegetation.** Impacts to Submerged Aquatic Vegetation (SAV) are not authorized by any NWP, except NWP 48, NWP 55 and NWP 56, unless Essential Fish Habitat (EFH) consultation has been completed pursuant to the Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act). Permittees shall submit a PCN (See NWP General Condition 32) to the District Engineer prior to commencing the activity if the project would affect SAV. The permittee may not begin work until notified by the Corps that the requirements of the Magnuson-Stevens Act have been satisfied and that the activity is verified.

B. REGIONAL CONDITIONS APPLICABLE TO ALL NWP's

1. **Critical Habitat in Western NC.** For proposed activities within waters of the U.S. that require a Pre-Construction Notification (PCN) and are located in the thirteen counties listed below, permittees must provide a copy of the PCN to the U.S. Fish and Wildlife Service (USFWS), 160 Zillicoa Street, Asheville, North Carolina 28801 and the Corps Asheville Regulatory Field Office. Please see General Condition 18 for specific PCN requirements

related to the Endangered Species Act and the below website for information on the location of designated critical habitat.

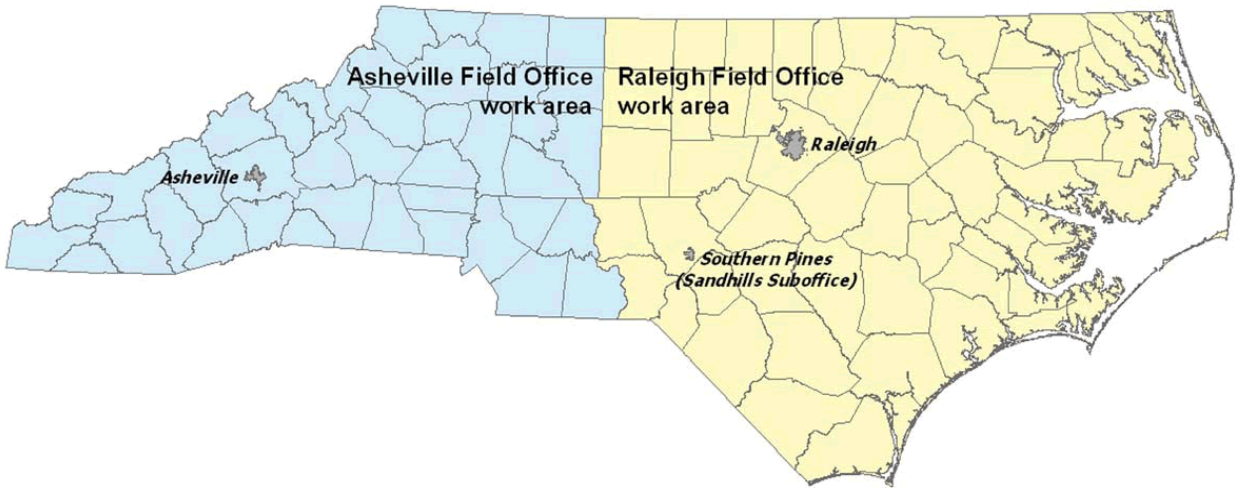
Counties with tributaries that drain to designated critical habitat that require notification to the Asheville U.S. Fish and Wildlife Service: Avery, Cherokee, Graham, Haywood, Henderson, Jackson, Macon, Mecklenburg, Mitchell, Swain, Transylvania, Union and Yancey.

Website and office addresses for Endangered Species Act Information:

The Wilmington District has developed the following website for permittees which provides guidelines on how to review linked websites and maps in order to fulfill NWP General Condition 18 (Endangered Species) requirements: http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram/AgencyCoordination/ESA.aspx.

Permittees who do not have internet access may contact the appropriate U.S. Fish and Wildlife Service offices listed below or Corps at (910) 251-4850.

Below is a map of the USFWS Field Office Boundaries:



Asheville U.S. Fish and Wildlife Service Office counties: All counties west of and including Anson, Stanly, Davidson, Forsythe and Stokes Counties.

U.S. Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
Telephone: (828) 258-3939

Raleigh U.S. Fish and Wildlife Service Office counties: All counties east of and including Richmond, Montgomery, Randolph, Guilford, and Rockingham Counties.

U.S. Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Telephone: (919) 856-4520

2. **Special Designation Waters.** Prior to the use of any NWP that involves a discharge of dredged or fill material in any of the following identified waters and/or adjacent wetlands in North Carolina, permittees shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32). The North Carolina waters and wetlands that require additional PCN requirements are:

"Primary Nursery Areas" (PNA), including inland PNA, as designated by the North Carolina Marine Fisheries Commission and/or the North Carolina Wildlife Resources Commission. The definition of and designated PNA waters can be found in the North Carolina State Administrative Code at Title 15A, Subchapters 3R and 10C (15A NCAC 03R .0103; 15A NCAC 10C .0502; and 15A NCAC 10C .0503) and at the following web pages:

- http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2003%20-%20marine%20fisheries/subchapter%20r/15a%20ncac%2003r%20.0103.pdf

- http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2010%20-%20wildlife%20resources%20and%20water%20safety/subchapter%20c/15a%20ncac%2010c%20.0502.pdf

- http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2010%20-%20wildlife%20resources%20and%20water%20safety/subchapter%20c/15a%20ncac%2010c%20.0503.pdf

3. **Trout Waters.** Prior to any discharge of dredge or fill material into streams, waterbodies or wetlands within the 294 designated trout watersheds of North Carolina, the permittee shall submit a PCN (see General Condition 32) to the District Engineer prior to commencing the activity. The permittee shall also provide a copy of the PCN to the appropriate NCWRC office, or to the EBCI FWM Office (if the project is located on EBCI trust land), to facilitate the determination of any potential impacts to designated Trout Waters.

NCWRC and NC Trout Watersheds:

NCWRC Contact**	Counties that are entirely within Trout Watersheds*	Counties that are partially within Trout Watersheds*

Mountain Coordinator 645 Fish Hatchery Rd., Building B Marion, NC 28752 828-803-6054 For NCDOT Projects: NCDOT Coordinator 12275 Swift Rd. Oakboro, NC 28129 704-984-1070	Alleghany Ashe Avery Graham Haywood Jackson Macon Swain Transylvania Watauga	Burke Buncombe Caldwell Cherokee Clay Henderson Madison McDowell Mitchell Polk Rutherford Surry Wilkes Yancey
EBCI Contact**	**Counties that are within Trout Watersheds***	
Office of Natural Resources P.O. Box 1747, Cherokee, NC 28719 (828) 359-6113	Qualla Boundary and non-contiguous tracts of trust land located in portions of Swain, Jackson, Haywood, Graham and Cherokee Counties.	

*NOTE: To determine PCN requirements, contact the Corps Asheville Regulatory Field Office at (828) 271-7980 or view maps showing trout watersheds in each County at the following webpage: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Trout/.

**If a project is located on EBCI trust land, submit the PCN in accordance with Regional Condition C.16. Contact the Corps Asheville Regulatory Field Office at (828) 271-7980 with questions.

4. **Western NC Waters and Corridors.** The permittee shall submit a PCN (see General Condition 32) to the District Engineer prior to commencing the activity in waters of the U.S. if the activity will occur within any of the following identified waters in western North Carolina, within 0.5 mile on either side of these waters, or within 0.75 mile of the Little Tennessee River, as measured from the top of the bank of the respective water (i.e., river, stream, or creek):

Brasstown Creek
Burningtown Creek

Cane River
Caney Fork
Cartoogechaye Creek
Chattooga River
Cheoah River
Cowee Creek
Cullasaja River
Deep Creek
Ellijay Creek
French Broad River
Garden Creek
Hiwassee River
Hominy Creek
Iotla Creek
Little Tennessee River (within the river or within 0.75 mile on either side of this river)
Nantahala River
Nolichucky River
North Fork French Broad River
North Toe River
Nottley River
Oconaluftee River (portion not located on trust/EBCI land)
Peachtree Creek
Shooting Creek
Snowbird Creek
South Toe River
Stecoah Creek
Swannanoa River
Sweetwater Creek
Tuckasegee River (also spelled Tuckaseegee or Tuckaseigee)
Valley River
Watauga Creek
Watauga River
Wayah Creek
West Fork French Broad River

To determine PCN requirements, contact the Corps Asheville Regulatory Field Office at (828) 271-7980 or view maps for all corridors at the following webpage: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Designated-Special-Waters.aspx .

5. **Limitation of Loss of Stream Bed.** NWPs may not be used for activities that may result in the loss of more than 0.05 acres of stream bed, except for NWP 32.

6. **Pre-Construction Notification for Loss of Stream Bed Exceeding 0.02 acres.** The permittee shall submit a PCN to the District Engineer prior to commencing the activity (see General Condition 32) prior to the use of any NWP for any activity that results in the loss of more than 0.02 acres of stream bed. This applies to NWPs that do not have PCN requirements as well as those NWPs that require a PCN.

7. **Mitigation for Loss of Stream Bed.** For any NWP that results in a loss of more than 0.02 acres of stream bed, the permittee shall provide a mitigation proposal to compensate for more than minimal individual and cumulative adverse impacts to the aquatic environment, unless the

District Engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal. For stream bed losses of 0.02 acres or less that require a PCN, the District Engineer may determine, on a case-by-case basis, that compensatory mitigation is required to ensure that the activity results in minimal adverse effect on the aquatic environment.

8. **Riprap.** For all NWPs that allow for the use of riprap material for bank stabilization, the following conditions shall be applied:

a. Filter cloth must be placed underneath the riprap as an additional requirement of its use in North Carolina waters. The placement of filter fabric is not required if the riprap will be pushed or “keyed” into the bank of the waterbody. A waiver from the specifications in this Regional Condition must be requested in writing.

b. Riprap shall be placed only on the stream banks, or, if it is necessary to be placed in the stream bed, the finished top elevation of the riprap should not exceed that of the original stream bed.

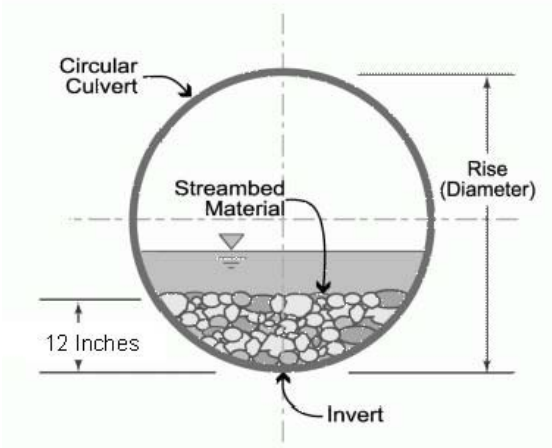
9. **Culvert Placement.** For all NWPs that allow for culvert placement, the following conditions shall be applied:

a. For all NWPs that involve the construction/installation of culverts, measures shall be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms

Placement of culverts and other structures in streams shall be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20% of the culvert diameter for culverts having a diameter less than or equal to 48 inches. If the culvert outlet is submerged within a pool or scour hole and designed to provide for aquatic passage, then culvert burial into the streambed is not required.

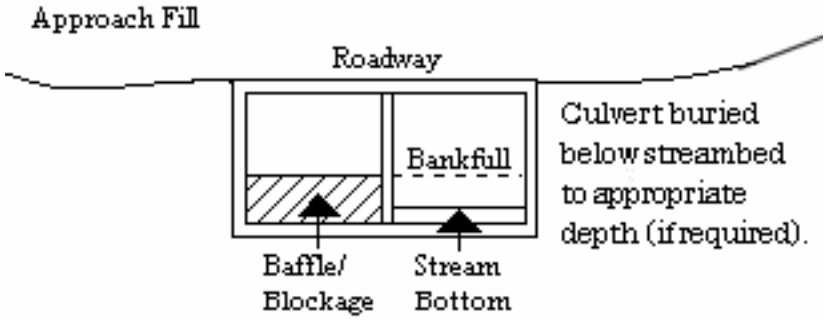
Culvert burial is not required for structures less than 72 inch diameter/width, where the slope of the culvert will be greater than 2.5%, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/connectivity has been provided when possible (e.g., rock ladders, cross vanes, sills, baffles etc.). Culvert burial is not required when bedrock is present in culvert locations.

Installation of culverts in wetlands shall ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. When roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges shall be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.



A waiver from the depth specifications in this condition may be requested, in writing, by the permittee and issued by the Corp. This waiver request must be specific as to the reasons(s) for the request. The waiver will be issued if it can be demonstrated that the proposed design would result in less impacts to the aquatic environment. Culverts placed across wetland fills purely for the purposes of equalizing surface water do not have to be buried, but the culverts must be of adequate size and/or number to ensure unrestricted transmission of water.

b. Bank-full flows (or less) shall be accommodated through maintenance of the existing bank-full channel cross sectional area. Additional culverts or culvert barrels at such crossings shall be allowed only to receive bank-full flows.



c. Culverts shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. The dimension, pattern, and profile of the stream above and below a pipe or culvert shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed culvert shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. If the width of the culvert is wider than the stream channel, the culvert shall include multiple boxes/pipes, baffles, benches and/or sills to maintain the natural width of the stream channel. If multiple culverts/pipes/barrels are used, low flows shall be accommodated in one culvert/pipe and additional culverts/pipes shall be installed such that they receive only flows above bankfull.

10. **Utility Lines.** For all NWPs that allow for the construction and installation of utility lines, the following conditions shall be applied:

a. Utility lines consisting of aerial electric power transmission lines crossing navigable waters of the U.S. (which are defined at 33 CFR part 329) must comply with the applicable minimum clearances specified in 33 CFR 322.5(i).

b. The work area authorized by this permit, including temporary and/or permanent fills, will be minimized to the greatest extent practicable. Justification for work corridors exceeding forty (40) feet in width is required and will be based on pipeline diameter and length, size of equipment required to construct the utility line, and other construction information deemed necessary to support the request. The permittee is required to provide this information to the Corps with the initial PCN package.

c. A plan to restore and re-vegetate wetland areas cleared for construction must be submitted with the required PCN. Cleared wetland areas shall be re-vegetated, as appropriate, with species of canopy, shrub, and herbaceous species. The permittee shall not use fescue grass or any other species identified as invasive or exotic species by the NC Native Plant Society (NCNPS): https://ncwildflower.org/invasive-exotic-species-list/.

d. Any permanently maintained corridor along the utility right of way within forested wetlands shall be considered a loss of aquatic function. A compensatory mitigation plan will be required for all such impacts associated with the requested activity if the activity requires a PCN and the cumulative total of permanent conversion of forested wetlands exceeds 0.1 acres, unless the District Engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal.

Where permanently maintained corridor within forested wetlands is 0.1 acres or less, the District Engineer may determine, on a case-by-case basis, that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment.

e. When directional boring or horizontal directional drilling (HDD) under waters of the U.S., including wetlands, permittees shall closely monitor the project for hydraulic fracturing or “fracking.” Any discharge from hydraulic fracturing or “fracking” into waters of the U.S., including wetlands, shall be reported to the appropriate Corps Regulatory Field Office within 48 hours. Restoration and/or compensatory mitigation may be required as a result of any unintended discharges.

11. **Temporary Access Fills.** The permittee shall submit a PCN to the District Engineer prior to commencing the activity if the activity will involve the discharge of dredged or fill material into more than 0.1 acres of wetlands or 0.02 acres of stream channel for the construction of temporary access fills and/or temporary road crossings. The PCN must include a restoration plan that thoroughly describes how all temporary fills will be removed, how pre-project conditions will be restored, and include a timetable for all restoration activities.

12. **Federal Navigation Channel Setbacks.** Authorized structures and fills located in or adjacent to Federally authorized waterways must be constructed in accordance with the latest setback criteria established by the Wilmington District Engineer. You may review the setback policy at http://www.saw.usace.army.mil/Missions/Navigation/Setbacks.aspx. This general permit does not authorize the construction of hardened or permanently fixed structures within the Federally Authorized Channel Setback, unless the activity is approved by the Corps. The permittee shall submit a PCN (see General Condition 32) to the District Engineer to obtain a written verification prior to the construction of any structures or fills within the Federally Authorized Channel Setback.

13. **Northern Long-eared Bat – Endangered Species Act Compliance.** The Wilmington District, U.S. Army Corps of Engineers has consulted with the United States Fish and Wildlife

Service (USFWS) in regard to the threatened northern long-eared bat (NLEB) (*Myotis septentrionalis*) and Standard Local Operating Procedures for Endangered Species (SLOPES) have been approved by the Corps and the USFWS. This condition concerns effects to the NLEB only and does not address effects to other federally listed species and/or federally designated critical habitat.

a. Procedures when the Corps is the lead federal* agency for a project:

The permittee must comply with (1) and (2) below when:

• the project is located in the western 41 counties of North Carolina, to include non-federal aid North Carolina Department of Transportation (NCDOT) projects, OR;

• the project is located in the 59 eastern counties of North Carolina and is a non-NCDOT project.

*Generally, if a project is located on private property or on non-federal land, and the project is not being funded by a federal entity, the Corps will be the lead federal agency due to the requirement to obtain Department of the Army authorization to impact waters of the U.S. If the project is located on federal land, contact the Corps to determine the lead federal agency.

(1) A permittee using an NWP must check to see if their project is located in the range of the NLEB by using the following website: http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf. If the project is within the range of the NLEB, or if the project includes percussive activities (e.g., blasting, pile driving, etc.), the permittee is then required to check the appropriate website in the paragraph below to discover if their project:

• is located in a 12-digit Hydrologic Unit Code area (“red HUC” - shown as red areas on the map), AND/OR;

• involves percussive activities within 0.25 mile of a red HUC.

Red HUC maps - for the western 41 counties in NC (covered by the Asheville Ecological Services Field Office), check the project location against the electronic maps found at: http://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html. For the eastern 59 counties in NC (covered by the Raleigh Ecological Services Field Office), check the project location against the electronic maps found at: https://www.fws.gov/raleigh/NLEB_RFO.html.

(2) A permittee must submit a PCN to the District Engineer, and receive written verification from the District Engineer, prior to commencing the activity, if the activity will involve any of the following:

• tree clearing/removal and/or, construction/installation of wind turbines in a red HUC, AND/OR;

• bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, (applies anywhere in the range of the NLEB), AND/OR:

• percussive activities in a red HUC, or within 0.25 mile of a red HUC.

The permittee may proceed with the activity without submitting a PCN to either the Corps or the USFWS, provided the activity complies with all applicable NWP terms and general and regional conditions, if the permittee's review under A.(1) and A.(2) above shows that the project is:

- located outside of a red HUC (and there are no percussive activities), and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;
- located outside of a red HUC and there are percussive activities, but the percussive activities will not occur within 0.25-mile of a red HUC boundary, and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;
- located in a red HUC, but the activity will NOT include tree clearing/removal; construction/installation of wind turbines; bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, and/or; any percussive activities.

b. Procedures when the USACE is not the lead federal agency:

For projects where another federal agency is the lead federal agency - if that other federal agency has completed project-specific ESA Section 7(a)(2) consultation for the NLEB, and has (1) determined that the project would not cause prohibited incidental take of the NLEB, and (2) completed coordination/consultation that is required by the USFWS (per the directions on the respective USFWS office's website), that project may proceed without PCN to either the USACE or the USFWS, provided all General and Regional Permit Conditions are met.

The NLEB SLOPES can be viewed on the USACE website at: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/ESA/. Permittees who do not have internet access may contact the USACE at (910) 251- 4633.

14. **West Indian Manatee Protection.** In order to protect the endangered West Indian manatee (*Trichechus manatus*) the Permittee shall implement the USFWS' Manatee Guidelines, and strictly adhere to all requirements therein. The guidelines can be found at https://www.fws.gov/raleigh/pdfs/ManateeGuidelines2017.pdf.

15. **ESA Programmatic Biological Opinions.** The Wilmington District, USFWS, NCDOT, and the FHWA have conducted programmatic Section 7(a)(2) consultation for a number of federally listed species and designated critical habitat (DCH), and programmatic consultation concerning other federally listed species and/or DCH may occur in the future. The result of completed programmatic consultation is a Programmatic Biological Opinion (PBO) issued by the USFWS. These PBOs contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" of whichever species or critical habitat is covered by a specific PBO. Authorization under NWPs is conditional upon the permittee's compliance with all the mandatory terms and conditions associated with incidental take of the applicable PBO (or PBOs), which are incorporated by reference in the NWPs. Failure to comply with the terms and conditions associated with incidental take of an applicable PBO, where a take of the federally listed species occurs, would constitute an unauthorized take by the permittee, and would also constitute permittee non-compliance with the authorization under the NWPs. If the terms and conditions of a specific PBO (or PBOs) apply to a project, the Corps will include this/these requirements in any NWP verification that may be issued for a project. For an activity/project that does not require a PCN, the terms and conditions of the applicable PBO(s) also apply to that non-notifying

activity/project. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its PBO and the ESA. All PBOs can be found on our website at: https://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/ESA/.

16. **Work on Eastern Band of Cherokee Indian Land.**

Notifying NWPs - All PCNs submitted for activities in waters of the U.S. on Eastern Band of Cherokee Indians (EBCI) trust land (i.e., Qualla Boundary and non-contiguous tracts of trust land located in portions of Swain, Jackson, Haywood, Graham and Cherokee Counties), must comply with the requirements of the latest MOU between the Wilmington District and the EBCI.

Non-notifying NWPs - Prior to the use of any non-notifying NWP for activities in waters of the U.S. on EBCI trust land (i.e., Qualla Boundary and non-contiguous tracts of trust land located in portions of Swain, Jackson, Haywood, Graham and Cherokee Counties), all prospective permittees must comply with the requirements of the latest MOU between the Wilmington District and the EBCI; this includes coordinating the proposed project with the EBCI Natural Resources Program and obtaining a Tribal Approval Letter from the Tribe.

The EBCI MOU can be found at the following URL: http://saw-reg.usace.army.mil/FO/Final-MOU-EBCI-USACE.pdf

17. **Sedimentation and Erosion Control Structures and Measures.**

All PCNs will identify and describe sedimentation and erosion control structures and measures proposed for placement in waters of the U.S. The structures and measures should be depicted on maps, surveys or drawings showing location and impacts to jurisdictional wetlands and streams.

C. REGIONAL CONDITIONS APPLICABLE TO NWP 3

1. In designated trout watersheds, a PCN is not required for impacts to a maximum of 0.02 acres for temporary dewatering) of streams and waterbodies when conducting maintenance activities. Minor deviations in an existing structure's configuration, temporary structures and temporary fills are authorized as part of the maintenance activity. In designated trout watersheds, the permittee shall submit a PCN (see Regional Condition C.3 above and General Condition 32) to the District Engineer prior to commencing the activity if; 1) impacts (other than temporary dewatering to work in dry conditions) to streams or waterbodies exceed 0.008 acres; 2) temporary impacts to streams or waterbodies associated with dewatering to work in dry conditions exceeds 0.02 acres; 3) the project will involve impacts to wetlands; 4) the project involves the replacement of a bridge or spanning structure with a culvert or non-spanning structure in waters of the United States; or 5) the activity will be constructed during the trout waters moratorium (October 15 through April 15).

D. SECTION 401 WATER QUALITY CERTIFICATION (WQC) AND/OR COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY DETERMINATION SUMMARY AND APPLICABLE CONDITIONS

The CZMA Consistency Determination and all Water Quality Certifications for the NWPs can be found at: https://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Permits/2017-Nationwide-Permits/

DEPARTMENT OF THE ARMY
Wilmington District, Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403-1343
http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram.aspx

General Permit No. 197800056
Name of Permittee: General Public
Effective Date: January 1, 2022
Expiration Date: December 31, 2026

DEPARTMENT OF THE ARMY
REGIONAL GENERAL PERMIT (RGP)

A RGP to perform work in or affecting navigable waters of the U.S. and waters of the U.S., upon recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403), and Section 404 of the Clean Water Act (33 U.S.C. 1344), is hereby modified and renewed by authority of the Secretary of the Army by

District Engineer
U.S. Army Engineer District, Wilmington
Corps of Engineers
69 Darlington Avenue
Wilmington, North Carolina 28403-1343

TO MAINTAIN, REPAIR, CONSTRUCT AND INSTALL PIERS, DOCKS, BOATHOUSES AND BOAT SHELTERS, PILINGS, MOORING BOUYS, DOLPHINS, JETTIES, GROINS, AND BREAKWATER STRUCTURES IN NAVIGABLE WATERS OF THE U.S. IN THE STATE OF NORTH CAROLINA.

Projects must be constructed in conformance with the following standards in order to be authorized by this RGP.

1. All piers, docks, boathouses, and boat shelters will be pile-supported or floating structures.

2. Pilings, dolphins, jetties, and breakwater structures may be constructed of wood, metal, or pre-cast concrete. Groins may be constructed of wood, pre-cast concrete, or rock riprap.

3. Breakwater structures will be designed to provide for adequate water circulation landward of the structures.

This RGP does not authorize dredging or excavation, or the discharge of dredged, excavated, or fill material within waters of the U.S., except for the placement of

structures for jetty, breakwater, or groin construction. This RGP does not authorize any work on Atlantic Ocean beaches.

The following definitions will be used for purposes of this RGP:

a. Mean high water mark (MHWM): The line on the shore, in tidal water, reached by the plane of the mean (average) high water. The precise determination of the actual location of the line can be established by survey with the reference to the available tidal datum, preferably averaged over a period of 18.6 years. A less precise method, such as observation of the apparent shoreline, which is determined by reference to physical markings, lines of vegetation, may be used for the purpose of this permit.

b. Ordinary High Water Mark (OHWM): The line on the shore, in non-tidal waters, established by the fluctuations of water indicated by physical characteristics such as clear, natural line impressed on the bank; shelving changes in the soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas.

Special Conditions

a. Authorized structures located on or adjacent to Federally authorized waterways will be constructed in accordance with the latest setback criteria established by the Wilmington District Engineer. You may review the setback policy at http://www.saw.usace.army.mil/Missions/Navigation/Setbacks.aspx. This RGP does not authorize the construction of hardened or permanently fixed structures within the Federally Authorized Channel Setback, unless the activity is approved by the Corps. The Permittee must submit the information described in General Condition "y" and obtain approval from the Corps prior to the construction of any structures within the Federally Authorized Channel Setback.

b. Floating structures installed within the Federally Authorized Channel Setback must be designed to be removable. No utilities or infrastructure shall be permanently fixed/attached to floating structures located within the Federally Authorized Channel Setback. The Permittee must submit the information described in General Condition "y" and obtain approval from the Wilmington District Corps of Engineers (Corps) prior to the construction of any structures within the Federally Authorized Channel Setback.

c. This RGP does not authorize construction across or into any natural or manmade channel or waterbody in any manner that may adversely affect navigation by the general public.

d. Piers, docks, boathouses, boat shelters and piles authorized by this RGP may be extended or be located up to 400 feet waterward of the Mean High Water Mark (MHWM) elevation contour (tidal areas), or the Ordinary High Water Mark (OHWM) elevation contour (non-tidal areas), or one-third (1/3) the width of a waterbody,

whichever is closer to the shoreline, except as otherwise governed by the presence of a Federally maintained channel.

e. The width of any pier will not exceed six (6) feet, unless the Corps determines, in writing, that a greater width is necessary for safe use, to improve public access, or to support a water dependent use that cannot otherwise occur.

f. The total square footage of shaded impact for docks and mooring facilities (excluding the pier) allowed shall be 8 square feet per linear foot of shoreline with a maximum of 800 square feet. In calculating the shaded impact, uncovered open water slips shall not be counted in the total. The maximum size of any individual component of the docking facility (excluding the pier) authorized by this RGP shall not exceed 400 square feet unless the Corps determines, in writing, that a greater width is necessary for safe use, to improve public access, or to support a water dependent use that cannot otherwise occur.

g. Boathouses and boat shelters will not be enclosed and will not exceed 400 square feet. Boatlifts will be open and will not exceed 400 square feet.

h. Boathouses, boatlifts, boat shelters and will not be constructed over Federally jurisdictional wetlands.

i. Docks and piers extending over wetlands will be elevated sufficiently (minimum of 3 feet) above the wetland substrate to prevent total shading of vegetation, substrate, or other elements of the aquatic environment.

j. Groins, jetties, or breakwater structures shall not be constructed in wetlands, seagrasses, and other submerged aquatic vegetation.

k. Piers and docking facilities located over submerged aquatic vegetation may be constructed without prior consultation from the National Marine Fisheries Service if the following two conditions are met:

1) Water depth at the docking facility location is equal to or greater than two feet at mean low water level: and

2) The pier and docking facility are located to minimize the area of submerged aquatic vegetation under the structure.

l. Floating piers and docking facilities located over submerged aquatic vegetation shall be allowed if the water depth between the bottom of the proposed structure and the substrate is at least 18 inches at mean low water level.

m. Jetties will not extend farther than 100 feet waterward of the MHWM (tidal areas), or the OHWM elevation contours.

n. This RGP does not authorize the installation of fueling facilities on authorized structures.

o. Riprap groins shall not exceed a base width of 10 feet.

p. Riprap groins must be constructed of clean rock or masonry material and be of sufficient size to prevent displacement by wave or current action.

q. No groin shall extend more than 25 feet waterward of the mean high water or normal water level elevation contour.

r. Groins and jetties shall not be located within primary nursery areas.

s. No jetty shall be constructed during the period between April 1 and September 30 unless the activity is approved by NCDMF and the NMFS.

t. Floating structures will be supported by material that will not become waterlogged or sink when punctured, will be installed to provide for fluctuations in water elevation, will be designed so that the structure will not rest on the bottom of the waterbody at any time, and will be secured in such manner as to not break away.

u. Breakwater structures will be no longer than 500 feet. They will have a minimum of one-inch openings between standard width (6 to 12-inch) sheathing boards and at least one, five-foot wide opening for each 100 linear feet of structure.

v. Breakwater structures may not be constructed so as to prohibit access to estuarine waters or public trust areas.

w. It is possible that the authorized structure may be damaged by wave wash from passing vessels. The issuance of this permit does not relieve the Permittee from taking all proper steps to ensure the integrity of the permitted structure and the safety of moored boats. The Permittee will not hold the US liable for any such damage.

x. This RGP does not authorize habitable structures or any structure or associated facility for non-water related use.

y. Structures and their attendant utilities, authorized by this RGP, located on lands subject to an easement in favor of the US for the operation, maintenance, improvement, and enlargement of the Atlantic Intracoastal Waterway (AIWW), will be removed at the expense of the Permittee, in the event that, in the judgment of the U.S. Army Corps of Engineers acting on behalf of the US, the lands are needed at any time for any purpose within the scope of the easement. Permanent buildings will not be constructed within the easement.

z. This RGP does not apply to structures within existing or proposed marinas as defined by North Carolina Administrative Code, Title 15, Subchapter 7H.0208(b)(5).

aa. Should all or part of a proposed development activity be located in an Area of Environmental Concern (AEC) as designated by the North Carolina Coastal Resources Commission, a Coastal Area Management Act (CAMA) permit is required from the North Carolina Division of Coastal Management before the onset of the proposed activity. Should a Federal activity within any of North Carolina's twenty coastal counties or which could affect a coastal use or resource in any of North Carolina's twenty coastal counties be proposed by a Federal agency, a consistency determination pursuant to Subpart "C" of 15 CFR 930 must be prepared and submitted by that Federal agency to the North Carolina Division of Coastal Management before the onset of the proposed activity.

General Conditions.

a. Except as authorized by this RGP or any Corps approved modification to this RGP, no excavation, fill or mechanized land-clearing activities shall take place within waters or wetlands, at any time in the construction or maintenance of this project. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area. This prohibition applies to all borrow and fill activities connected with this project.

b. Authorization under this RGP does not obviate the need to obtain other federal, state, or local authorizations.

c. All work authorized by this RGP must comply with the terms and conditions of the applicable Clean Water Act Section 401 Water Quality Certification for this RGP issued by the North Carolina Division of Water Resources.

d. The Permittee shall employ all sedimentation and erosion control measures necessary to prevent an increase in sedimentation or turbidity within waters and wetlands outside the permit area. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project must remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4).

e. The activities authorized by this RGP must not interfere with the public's right to free navigation on all navigable waters of the U.S. No attempt will be made by the Permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the authorized work for a reason other than safety.

f. The Permittee understands and agrees that, if future operations by the US require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his/her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the

navigable waters, the Permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the US. No claim shall be made against the US on account of any such removal or alteration.

g. The Permittee, upon receipt of a notice of revocation of the permit for the verified individual activity, may apply for an individual permit, or will, without expense to the US and in such time and manner as the Secretary of the Army or his/her authorized representative may direct, restore the affected water of the US to its former conditions.

h. This RGP does not authorize any activity that would conflict with a federal project's congressionally authorized purposes, established limitations or restrictions, or limit an agency's ability to conduct necessary operation and maintenance functions. Per Section 14 of the Rivers and Harbors Act of 1899, as amended (33 U.S.C. 408), no project that has the potential to take possession of or make use of for any purpose, or build upon, alter, deface, destroy, move, injure, or obstruct a federally constructed work or project, including, but not limited to, levees, dams, jetties, navigation channels, borrow areas, dredged material disposal sites, flood control projects, etc., shall be permitted unless the project has been reviewed and approved by the appropriate Corps approval authority. The Permittee must submit the information described in General Condition "y" and obtain approval from the Wilmington District Engineer prior to the initiation of any activity that has the potential to modify or conflict with a federally authorized project.

i. The Permittee shall obtain a Consent to Cross Government Easement from the Wilmington District's Land Use Coordinator prior to any crossing of the Corps easement and/or prior to commencing construction of any structures, authorized dredging or other work within the right-of-way of, or in proximity to, a federally designated disposal area. The Land Use Coordinator may be contacted at: CESAW-OP-N, 69 Darlington Avenue, Wilmington, North Carolina 28403-1343, email: SAWWeb-NAV@usace.army.mil.

j. The Permittee will allow the Wilmington District Engineer or his/her representative to inspect the authorized activity at any time deemed necessary to assure that the activity is being performed or maintained in strict accordance with the Special and General Conditions of this permit.

k. This RGP does not grant any property rights or exclusive privileges.

l. This RGP does not authorize any injury to the property or rights of others.

m. This RGP does not authorize the interference with any existing or proposed federal project.

n. In issuing this RGP, the Federal Government does not assume any liability for the following:

(1) Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

(2) Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the US in the public interest.

(3) Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this RGP.

(4) Design or construction deficiencies associated with the permitted work

(5) Damage claims associated with any future modification, suspension, or revocation of this RGP.

o. Authorization provided by this RGP may be modified, suspended, or revoked in whole or in part if the Wilmington District Engineer, acting for the Secretary of the Army, determines that such action would be in the best public interest. The term of this RGP shall be five (5) years unless subject to modification, suspension, or revocation. Any modification, suspension or revocation of this authorization will not be the basis for any claim for damages against the US Government.

p. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or "study river" (e.g., National Park Service, U.S. Forest Service, etc.)

q. This RGP does not authorize any activity within, or directly affecting, a marine sanctuary established by the Secretary of Commerce under authority of Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, unless the Permittee provides the Corps with a certification from the Secretary of Commerce that the proposed activity is consistent with the purposes of Title III of the Marine Protection, Research and Sanctuaries Act. Information on marine sanctuaries may be obtained at http://sanctuaries.noaa.gov/#MN. Permittees may not begin work until they provide the Corps with a written certification from the Department of Commerce.

r. In cases where the Wilmington District Engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places and its codified regulations, the National Historic Preservation Amendment Acts of 1980 and 1992, the Abandoned Shipwreck Act of 1987 and the Native American Graves Protection and Repatriation Act, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. Permittees must submit the information described in General Condition "y" to the Corps if any properties subject

to the above criteria may be affected by the proposed project. The Permittee may not begin work until notified by the Corps that the requirements of the NHPA have been satisfied and that the activity is authorized.

s. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the Wilmington District Engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The Wilmington District Engineer will initiate the Federal, tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

t. No activity is authorized under this RGP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any RGP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed*. Information on threatened and endangered species and their critical habitat can be obtained directly from the Corps field offices, the USFWS field offices or at the following web addresses: http://www.fws.gov/ or http://www.fws.gov/ipac/ or http://www.noaa.gov/fisheries.html. Permittees must submit the information described in General Condition "y" to the Corps if any listed species or designated critical habitat may be affected by the proposed project. Permittees may not begin work until notified by the Wilmington District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized.

*Note - Section 7 consultation has been completed for the West Indian Manatee and if the activity may affect the manatee, the Permittee does not have to submit the information in General Condition "y" to the District Engineer as long the Permittee complies with General Condition "u". Section 7 consultation has been completed for the Northern long-eared bat and the Permittee must submit the information described in General Condition "y" to the District Engineer prior to commencing the activity if the project meets the criteria in General Condition "v".

u. In order to further protect the endangered West Indian Manatee (*Trichechus manatus)*, the Permittee must implement the USFWS' Manatee Guidelines, and strictly adhere to all requirements therein. The guidelines can be found at https://www.fws.gov/raleigh/pdfs/ManateeGuidelines2017.pdf.

v. The Wilmington District, U.S. Army Corps of Engineers (Corps) has consulted with the US Fish and Wildlife Service (Service) in regard to the threatened Northern long-eared bat (NLEB) (*Myotis septentrionalis*) and Standard Local Operating Procedures for Endangered Species (SLOPES) have been approved by the Corps and the Service. This condition concerns effects to the NLEB only and does not address effects to other federally listed species and/or to federally-designated critical habitat.

A. Procedures when the Corps is the lead federal* agency for a project:

The Permittee must comply with (1) and (2) below when:

• The project is located in the western 41 counties of North Carolina, to include non-federal aid North Carolina Department of Transportation (NCDOT) projects, OR;

• The project is located in the 59 eastern counties of North Carolina and is a non-NCDOT project.

*Generally, if a project is located on private property or on non-federal land, and the project is not being funded by a federal entity, the Corps will be the lead federal agency due to the requirement to obtain Department of the Army authorization to impact waters of the U.S. If the project is located on federal land, contact the Corps to determine the lead federal agency.

(1) A Permittee using a RGP must check to see if their project is located in the range of the NLEB by using the following website: http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf. If the project is within the range of the NLEB, or if the project includes percussive activities (e.g., blasting, pile driving, etc.), the Permittee is then required to check the appropriate website in the paragraph below to discover if their project:

• Is located in a 12-digit Hydrologic Unit Code area ("red HUC" - shown as red areas on the map), AND/OR;

• Involves percussive activities within 0.25 mile of a red HUC.

Red HUC maps - for the western 41 counties in NC (covered by the Asheville Ecological Services Field Office), check the project location against the electronic maps found at: http://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html. For the eastern 59 counties in NC (covered by the Raleigh Ecological Services Field Office), check the project location against the electronic maps found at: https://www.fws.gov/raleigh/NLEB_RFO.html.

(2) A Permittee must submit a pre-construction notification (PCN) to the district engineer, and receive written authorization from the district engineer, prior to commencing the activity, if the activity will involve either of the following:

• Tree clearing/removal, construction/installation of wind turbines in a red HUC, AND/OR;

• Bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, (applies anywhere in the range of the

NLEB), AND/OR:

- Percussive activities in a red HUC, or within 0.25 mile of a red HUC.

The Permittee may proceed with the activity without submitting a PCN to either the Corps or the USFWS, provided the activity complies with all applicable RGP terms and general and special conditions, and if the Permittee's review under A.(1) and A.(2) above shows that the project is:

- Located outside of a red HUC (and there are no percussive activities), and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;

- Located outside of a red HUC and there are percussive activities, but the percussive activities will not occur within 0.25-mile of a red HUC boundary, and the activity will NOT include bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, OR;

- Located in a red HUC, but the activity will NOT include tree clearing/removal; construction/installation of wind turbines; bridge removal or maintenance, unless the bridge has been inspected and there is no evidence of bat use, and/or; any percussive activities.

B. Procedures when the Corps is not the lead federal agency:

For projects where another federal agency is the lead federal agency - if that other federal agency has completed project-specific ESA Section 7(a)(2) consultation for the NLEB, and has (1) determined that the project would not cause prohibited incidental take of the NLEB, and (2) completed coordination/consultation that is required by the Service (per the directions on the respective Service office's website), that project may proceed without notification to either the Corps or the Service, provided all RGP general and special conditions are met.

The NLEB SLOPES can be viewed on the Corps website at the following World Wide Web Page: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/ESA/. Permittees who do not have internet access may contact the Corps at (910) 251- 4633.

w. The Wilmington District, USFWS, NCDOT, and the FHWA have conducted programmatic Section 7(a)(2) consultation for a number of federally listed species and habitat, and programmatic consultation concerning other federally listed species and/or habitat may occur in the future. The result of completed programmatic consultation is a Programmatic Biological Opinion (PBO) issued by the USFWS. These PBOs contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" of whichever species or critical habitat is covered by a specific PBO. Authorization under this RGP is conditional upon

the permittee's compliance with all the mandatory terms and conditions associated with incidental take of the applicable PBO (or PBOs), which are incorporated by reference in this RGP. Failure to comply with the terms and conditions associated with incidental take of an applicable PBO, where a take of the federally listed species occurs, would constitute an unauthorized take by the permittee, and would also constitute permittee non-compliance with the authorization under this RGP. If the terms and conditions of a specific PBO (or PBOs) apply to a project, the Corps will include this/these requirements in any RGP verification that may be issued for a project. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its PBO, and with the ESA. All PBOs can be found on our website at: https://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/ESA/

x. If the Permittee discovers or observes any live, damaged, injured or dead individual of an endangered or threatened species during construction, the Permittee shall immediately notify the Wilmington District Engineer so that required coordination can be initiated with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service.

y. For activities that require approval from the Corps prior to initiating any work, the Permittee must submit the following information to the appropriate Corps Regulatory Field Office. You may apply online at https://edocs.deq.nc.gov/Forms/Pre-Construction_Notification_Form.

1. Name, address, email and/or telephone number of the prospective Permittee.

2. Location of the proposed project, including waterbody, nearest community, and county.

3. A detailed description of the proposed project, including applicable project details such as width, height, length of structures or fills, piling span, distance from the shoreline, type of materials, location of structure(s), and the amount of proposed impact to waters and/or wetlands. The description must be sufficiently detailed to allow the Wilmington District Engineer to determine that the adverse effect of the project will be minimal and to determine the need for compensatory mitigation. Project drawings must be provided when necessary to show that the activity complies with the terms of the RGP. (Drawings usually clarify the project and when provided results in a quicker decision. Drawings must contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans).

z. Permittees are advised that development activities in or near a floodway may be subject to the National Flood Insurance Program that prohibits any development, including fill, within a floodway that results in any increase in base flood elevations.

This RGP does not authorize any activity prohibited by the National Flood Insurance Program.

aa. The Permittee must install and maintain, at his/her expense, any signal lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, on authorized facilities. For further information, the Permittee should contact Coast Guard Sector North Carolina at (910) 772-2191 or email Coast Guard Fifth District at cgd5waterways@uscg.mil.

bb. The Permittee must maintain any structure or work authorized by this permit in good condition and in conformance with the terms and conditions of this permit. The Permittee is not relieved of this requirement if the Permittee abandons the structure or work. Transfer in fee simple of the work authorized by this permit will automatically transfer this permit to the property's new owner, with all of the rights and responsibilities enumerated herein. The Permittee must inform any subsequent owner of all activities undertaken under the authority of this permit and provide the subsequent owner with a copy of the terms and conditions of this permit.

cc. At his sole discretion, any time during the processing cycle, the Wilmington District Engineer may determine that this RGP will not be applicable to a specific proposal. In such case, the procedures for processing an individual permit in accordance with 33 CFR 325 will be available.

dd. Except as authorized by this RGP or any Corps approved modification to this RGP, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used.

ee. Except as authorized by this RGP or any Corps approved modification to this RGP, all excavated material will be disposed of in approved upland disposal areas.

ff. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon this RGP will remain authorized provided the activity is completed within twelve months of the date of the RGP's expiration, modification, or revocation. Activities completed under the authorization of this RGP that were in effect at the time the activity was completed continue to be authorized by the RGP.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

Benjamin A. Bennett
Colonel, U.S. Army
District Commander