

**Contract Documents
for the
BURNING TREE WATER LINE REPLACEMENT
OWASA CIP # 375-02**

**Prepared for:
Orange Water and Sewer Authority
Carrboro, North Carolina**

**Prepared By:
McKim & Creed, Inc.
4300 Edwards Mill Road, Suite 200
Raleigh, NC 27612
919-233-8091**



ISSUED FOR BID

April 2026

NC License F-1222

M&C Project # 01519-0065

SECTION 00 01 10

TABLE OF CONTENTS

Section Title

INTRODUCTORY INFORMATION

00 00 01	Cover Page
00 01 10	Table of Contents

PROCUREMENT REQUIREMENTS

00 11 16	Advertisement for Bids
00 21 15	Instructions to Bidders
00 41 44	Proposal – Unit Price Contract Bid Form (including Bid Bond, Power of Attorney, Contractor Affidavit, Non-Collusion Affidavit(s), Equal Employment Opportunity Certification, Minority Business Participation Forms)

CONTRACTING REQUIREMENTS

00 52 15	Agreement
00 52 16	Form of Submittals
00 57 10	Dispute Resolution
00 57 20	E-Verify Affidavit
00 57 30	Iran Divestment Act Certification
00 57 40	Companies Boycotting Israel Divestment Act Certification Form
00 57 50	Certification Regarding Conflict of Interest
00 91 13	Addenda
00 C-700	2013 EJCDC Standard General Conditions of the Construction Contract

TECHNICAL SPECIFICATIONS

01 10 00	Summary of Work
01 10 26	Unit and Lump Sum Prices
01 10 60	Regulatory Requirements
01 10 95	Reference Standards and Definitions
01 12 00	Project Meetings
01 12 30	Alternates
01 13 00	Submittals
01 13 10	Project Schedules
01 13 90	Preconstruction Video
01 14 00	Quality Control
01 15 00	Construction Facilities and Temporary Controls
01 15 70	Traffic Control
01 16 00	Materials and Equipment
01 17 00	Contract Closeout
01 17 20	Project Record Documents



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

01 17 40	Warranties
01 19 00	Special Project Provisions
02275	Trenching, Backfilling, and Compaction of Utilities
02370	Erosion and Sedimentation Controls
02510	Water Distribution
02530	Sanitary Sewer
02900	Lawns and Grasses
03300	Cast-In-Place Concrete

APPENDICES

Appendix A – Project Permits

Appendix A.1 - North Carolina Department of Environmental Quality – Division of Water Resources Public Water Supply Section – Engineering Plans and Specifications for Water Supply Systems Approval

Appendix A.2 - North Carolina Department of Environmental Quality – Division of Energy, Mineral, and Land Resources – Erosion and Sedimentation Control Plan Approval with Modifications (*not included in this submittal*)

Appendix A.3 - North Carolina Department of Environmental Quality – Division of Energy, Mineral, and Land Resources NCG01 – Certificate of Coverage (*not included in this submittal*)

Appendix B – Geotechnical Report

-END OF SECTION-



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

DOCUMENT 00 11 16

ADVERTISEMENT FOR BIDS

CIP No.: 375-02

Project: Burning Tree Water Line Replacement

Owner: ORANGE WATER AND SEWER AUTHORITY
400 JONES FERRY ROAD
CARRBORO, NORTH CAROLINA 27510

Date: April 10, 2026

Pursuant to Section 143-129 of the General Statutes of North Carolina, sealed Bids will be received by Orange Water and Sewer Authority from Bidders until 3:00 P.M., local time, on THURSDAY, MAY 14, 2026 for CIP No. 375-02, Project: "Burning Tree Water Line Replacement" at the OWASA Administrative Offices, 400 Jones Ferry Road, Carrboro, North Carolina 27510, at which time the Bids received will be opened and read aloud.

Bids will be received for a Unit Price General Construction Contract. The Contractor and all Subcontractors shall have valid North Carolina General Contractor's Licenses for the type and value of the work to be performed.

The Project consists of furnishing all materials, labor, equipment, tools, etc. unless otherwise specified, for the complete and operable installation of:

Complete and operable installation of approximately 4,634 linear feet of 8-inch restrained joint polywrapped ductile iron water pipeline from the intersection of Raleigh Road and Burning Tree Drive through the intersection of Burning Tree Drive and Pinehurst Drive.

Installation of approximately 831 linear feet of 2-inch SDR 17 PVC water main and 90 linear feet of 2-inch type "K" hard copper water main to be installed via open cut.

Installation of all temporary and new permanent water services and interconnections, required to install complete and operable water lines meeting local requirements and requirements as described in the contract documents.

Abandonment of approximately 5,470 linear feet of 8-inch AC water pipe by cellular concrete or grout fill.

Applicable traffic control, restoration, erosion and sediment control, permitting, and other items required to meet local requirements and requirements as described in the contract documents.

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

The foregoing description shall not be construed as a complete description of all work required.

Beginning on FRIDAY, APRIL 10, 2026, the Contract Documents will be made available to perspective bidders. Printed copies of the Contract Documents are not available. Electronic copies will be transmitted to bidders by request through email, free of charge, by emailing **kmattingly@mckimcreed.com**.

The Contract Documents may be viewed free of charge at the OWASA Administrative Offices, 400 Jones Ferry Road, Carrboro, North Carolina, Mondays through Fridays, between the hours of 8:00 A.M. and 5:00 P.M.

Bidders shall attend a mandatory Pre-Bid Conference at 3:00 P.M., local time, on TUESDAY, April 28, 2026 at the 400 Jones Ferry Road, Carrboro, North Carolina OWASA Administration building.

Orange Water and Sewer Authority has adopted a minimum ten (10%) percent goal for participation by minority businesses in the total value of the work for this project in accordance with Section 143-128.2 of the General Statutes of North Carolina.

Each Bidder shall be licensed under Chapter 87 of the North Carolina General Statutes. Bidders are notified that "An Act to Regulate the Practice of General Contracting," was ratified by the General Assembly of North Carolina on March 10, 1925, and that this Act and subsequent Amendments, will be observed in receiving and awarding Contracts.

Each bidder is required to submit a Non-Collusion Affidavit pursuant to Section 133-30 of the General Statutes of North Carolina.

To ensure that all Bidders are kept up to date on any Addenda, changes, or information notices, please send an e-mail to: **kmattingly@mckimcreed.com** indicating your intention to prepare a Bid for the Project. Failure to complete this step may render your Bid as non-responsive.

Each Bidder is advised that the Work may be inspected and supervised by an Engineer or firm under the direction of Orange Water and Sewer Authority. The Engineer or firm may also be involved in the identification of specific repair areas and the proposed method of repairs for the Work.

Orange Water and Sewer Authority requires the Project to be at Substantial Completion within 365 consecutive calendar days from date of Notice to Proceed and at Final Completion 395 consecutive calendar days from date of Notice to Proceed

No Bid shall be considered or accepted unless at the time of its filing the same shall be accompanied by a deposit of a certified or cashier's check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation (FDIC), in an amount equal to five percent (5%) of the amount of the Bid. The check shall be made payable to Orange Water and Sewer Authority. Said deposit shall guarantee that the Contract will be entered into by the successful Bidder if the Award is made. Such deposit of certified or cashier's check may be held by Orange Water and Sewer Authority until the successful Bidder has executed and

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

delivered the Contract Documents, including performance and payment bond, to Orange Water and Sewer Authority and returned or kept in accordance with North Carolina General Statute 143-129.

In lieu of the certified or cashier's check deposit mentioned above, the Bidder may file a Bid Bond in the same amount executed by a corporate surety authorized to execute such bonds in North Carolina and conditioned as provided by North Carolina General Statute 143-129 and on the form(s) found in the Proposal section, or on file with the Engineer. Bid Bond forms enclosed as part of the Bidding Documents must be properly executed at the time Bids are submitted before a Bid will be considered. Properly executed Power of Attorney of the corporate surety's agent shall accompany such bond and be attached to the page provided therefore in the Bidding Documents.

Bids shall be submitted under a condition of irrevocability, except as required by law, for a period of or ninety (90) calendar days after the Bid opening.

Orange Water and Sewer Authority reserves the right to accept or reject any or all Bids, to waive any and all informalities, and to disregard all nonconforming or conditional Bids or counter Bids, and to accept the Bid that will be in the best interest of Orange Water and Sewer Authority.

ORANGE WATER AND SEWER AUTHORITY
Bill Rosa, Project Manager
April 10, 2026

-END OF DOCUMENT-

DOCUMENT 00 21 15

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders which are defined in the Standard General Conditions of the Construction Contract, EJCDC C-700 (2013 edition) and modified by Orange Water and Sewer Authority (Copyright 2013) shall have the meanings assigned to them in the General Conditions as modified, changed, added to or deleted by the General Conditions.
- A. Issuing Office - The office at which the Bidding Documents are to be received.
- B. The term "Successful Bidder" means the lowest, qualified, responsive and responsible Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an Award.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.01 The Bidding Documents are identified as "Project Manual including Bidding Documents, Contract Documents, and Technical Specifications for CIP No. 375-02, Project: "Burning Tree Water Line Replacement "
- 2.02 Beginning on FRIDAY, April 10, 2026, the Contract Documents will made available to perspective bidders. Printed copies of the Contract Documents are not available. Electronic copies will be transmitted to bidders by request through email, free of charge, by emailing kmattingly@mckimcreed.com. The Contract Documents are also available online at ConstructConnect, Hispanic Contractors, and Dodge Data & Analytics.
- 2.03 The Contract Documents may be viewed free of charge at the OWASA Administrative Offices, 400 Jones Ferry Road, Carrboro, North Carolina; Mondays through Fridays, between the hours of 8:00 A.M. and 5:00 P.M.
- 2.04 To ensure that all Bidders are kept up-to-date on any Addenda, changes, or information notices, please send an e-mail to: kmattingly@mckimcreed.com indicating your intention to prepare a Bid for the Project. Failure to complete this step may render your Bid as non-responsive.
- 2.05 Complete sets of Bidding Documents shall be used in preparing Bids; neither Orange Water and Sewer Authority nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.06 Upon receipt of Bidding Documents, Bidder shall verify that the Bidding Documents are complete. The Bidder shall notify the Engineer if they have received incomplete Bidding Documents.

- 2.07 Orange Water and Sewer Authority and Engineer, in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01 The Bidder shall demonstrate the ability to complete the majority of all portions of the Contract using equipment and personnel owned and employed by the Bidder. The Bidder shall include the following information in the Bid as an attachment, as specified in Document 00 41 44:
- A. That the Bidder will have availability to do the Work at the proper time or times, adequate equipment and facilities listing such equipment and facilities in such detail that they can be quickly and accurately checked.
 - B. That the Bidder has ample repair parts and supplies to maintain all equipment and facilities properly and with a minimum of delay.
 - C. If the Bidder is a corporation, the names of all corporate officers and the name of the executive who will give their personal attention to the Work
 - D. The bidder shall include a list of at least three (3) projects they have completed with their equipment and personnel within the past five (5) years that involves installation of a water line of similar diameter. This documentation shall be included with the Bid.
 - E. The Bidder shall perform Work amounting to at least 60% of the Contract, using its own personnel and equipment (owned or rented). No portion of the Contract shall be sublet, assigned, or otherwise disposed of without the expressed written consent of Orange Water and Sewer Authority. If the Bidder fails to demonstrate to Orange Water and Sewer Authority in its Bid submittal information that it has the ability to perform the specified percentage of the Work with its own personnel and equipment, its Bid may be considered non-responsive. The Bidder shall submit with its Bid, data supporting its ability to comply with this requirement.
- 3.02 Not used.
- 3.03 If the Bidder fails to demonstrate the ability to complete a majority of all portions of the Contract with equipment and personnel owned and employed by the Bidder, the Bid may be considered non-responsive.
- 3.03 The Bidder shall be licensed under Chapter 87 of the North Carolina General Statutes as a General Contractor.

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

4.01 Site and Other Areas

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

4.02 Existing Site Conditions

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

- 1. Article 5 of the General Conditions identifies:
 - a. Those reports known to Orange Water and Sewer Authority of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. Those drawings known to Orange Water and Sewer Authority of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. Those reports and drawings known to Orange Water and Sewer Authority relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
- 2. Owner will make copies of reports and drawings referenced above available to any Bidder upon request. These reports and drawings are not to be considered part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely as provided in the General Conditions, has been identified and established in the General Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 3. If the General Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions shall apply.

- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Orange Water and Sewer Authority and Engineer by owners of such Underground Facilities, including Orange Water and Sewer Authority, or others

- F. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions

appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the Scope of Work, appear in Paragraph 5.06 of the General Conditions.

4.03 Site Visit and Testing by Bidders

- A. Bidder shall conduct the required Site visit during normal working hours, (9:00 a.m. to 4:00 p.m., Monday through Friday) and shall not disturb any ongoing operations at the Site.
- B. On request, and to the extent Orange Water and Sewer Authority has control over the Site, and schedule permitting, Orange Water and Sewer Authority will provide Bidder access to the Site. Bidder shall obtain approval by the Town of Chapel Hill and/or NCDOT to conduct additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.
- C. Orange Water and Sewer Authority will not have any obligation to grant such access if doing so is not practical because of existing operations, security, or safety concerns, or restraints on Orange Water and Sewer Authority's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. All requests for access to the Site must be received forty-eight (48) hours prior to the preferred time of access. **All Site access requests must be made to and coordinated by the Orange Water and Sewer Authority Project Manager (919-503-8131).**
- F. The Bidder shall not access any Site without written permission from Orange Water and Sewer Authority. The Bidder shall be responsible for any damage (including damage to any underground utility and acceptable restoration) as a result of additional subsurface investigations.

4.04 Orange Water and Sewer Authority's Safety Program

- A. Site visits and Work at the Site are to be in accordance with Orange Water and Sewer Authority's safety program. As the General Conditions indicate, an Owner's safety program exists.

4.05 Other Work at the Site

- A. Reference is made to the General Conditions for the identification of the general nature of other Work of which Orange Water and Sewer Authority is aware (if any) that is to be performed at the Site by Orange Water and Sewer Authority or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. Subsurface data are offered in good faith solely for the purpose of placing the Bidder in receipt of all information available to Orange Water and Sewer Authority and Engineer, and in no event is to be considered part of the Contract Documents.

ARTICLE 5 – BIDDER’S REPRESENTATIONS

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

- A. Examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. Visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. Become familiar with and satisfy Bidder as to all federal, state, and local, Laws and Regulations, ordinances or rules that may affect cost, progress, and performance of the Work;
- D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the General Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. Consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs;
- F. Obtain and carefully study (or accept consequences of not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying and specific means, methods, techniques, sequences, and procedures of construction expressly

required by the Bidding Documents, and safety precautions and programs incident thereto;

- G. Agree based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- H. Become aware of the general nature of the Work to be performed by Orange Water and Sewer Authority and others at the Site that relates to the Work as indicated in the Bidding Documents;
- I. Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- K. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
- L. The submission of a Bid will constitute an incontrovertible representation by the Bidder that Bidder has complied with every requirement of this Article 5, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performing and furnishing of the Work.

ARTICLE 6 - PRE-BID CONFERENCE

- 6.01 Bidders are required to attend a mandatory Pre-Bid Conference at 3:00 P.M., local time, on TUESDAY, APRIL 28, 2026 at the 400 Jones Ferry Road OWASA Administrative building in Carrboro, North Carolina. Representatives of Orange Water and Sewer Authority, the Town of Chapel Hill, and the Engineer will be present to discuss the Project. Engineer will transmit to all prospective Bidders of record, such Addenda as Engineer considers necessary in response to questions arising from the Pre-Bid Conference. Oral statements may not be relied upon and shall not be binding or legally effective.
- 6.02 Bidder questions pertaining to the Work and M/WBE participation will be addressed at the Pre-Bid Conference.
- 6.03 Only Bids submitted by qualified Bidders will be considered responsive.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents shall be submitted in writing to the Engineer via email only to: kmattingly@mckimcreed.com. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda emailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. All Addenda will also be posted at least twenty-four (24) hours before Bids are opened. Questions received less than five (5) days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications shall be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Orange Water and Sewer Authority or Engineer.
- 7.03 **It shall be the Bidder's sole responsibility to make inquiry as to the Addenda issued.** All Addenda shall be bound and securely attached to the Bidding Documents and submitted with the Bid. All such Addenda shall become a part of the Contract Documents and Bidder shall be bound by such Addenda, whether or not received by the Bidder.

ARTICLE 8 - BID SECURITY

- 8.01 A Bid must be accompanied by a Bid security made payable to Orange Water and Sewer Authority in an amount equal to five (5%) percent of Bidder's maximum Bid price (if alternates determined by adding the base bid and all alternates), and in the form of a certified check, or bank money order, drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation (FDIC), or a Bid Bond (on the form included in the Bidding Documents) issued by a Surety meeting the requirements of Article 6 of the General Conditions and Article 8.02 herein-below. No Bid shall be considered or accepted unless at the time of its filing the same shall be accompanied by a Bid security. Said Bid security shall guarantee that the Contract shall be entered into by the successful Bidder if the Award is made.
- 8.02 In lieu of the certified check, bank money order deposit mentioned above, the Bidder may file a Bid Bond in the same amount executed by a corporate surety authorized to execute such bonds in North Carolina and conditioned as provided by North Carolina General Statute 143-129 and in the Bid Bond form found in the Proposal section, or on file with the Engineer. Bid Bond forms shall be properly executed at the time Bids are submitted before Bid will be considered. Properly executed Power of Attorney of the corporate surety's agent shall accompany such Bid Bond, and be attached to the page provided therefore in the Contract Documents.
- 8.03 The Bid security of the apparent Successful Bidder shall be retained until Orange Water and Sewer Authority officially Awards Contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required Contract security and met the other conditions of the Notice to Award, whereupon the Bid Security will be released. If the successful Bidder fails to execute and deliver the Contract Documents and furnish the required Contract security within fifteen (15) calendar days after the Notice of Award, Orange Water and Sewer Authority may consider Bidder to be in default, annul the Notice of Award, and the Bid Security of that Bidder will be forfeited. The Bid security of other Bidders whom Orange Water and Sewer Authority believes to have a reasonable chance of receiving the Award may be retained by Orange Water and Sewer Authority until the

earlier of seven (7) days after the Effective Date of the Agreement or ninety-one (91) calendar days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

- 8.04 Bid security of other Bidders that Orange Water and Sewer Authority believes to have a reasonable chance of receiving the Award may be retained by Orange Water and Sewer Authority until the earlier of seven (7) calendar day after the after the Effective Date of the Contract or ninety-one (91) calendar days after the Bid opening, whereupon the Bid security furnished by such Bidders will be released.

ARTICLE 9 - CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed (Contract Time) and ready for final payment are set forth in the Agreement. The Bidder shall commence Work on the date specified in the Notice to Proceed, and shall complete the Work within the stipulated Contract Time.

ARTICLE 10 - LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the Bidding and Contract Award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 11.02 The burden of proof of the merit of the proposed item is upon Bidder. The Engineer's decision of approval or disapproval of a proposed item will be final.
- 11.03 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 A Non-Collusion Affidavit Form for all Subcontractors shall be filed with Orange Water and Sewer Authority within five (5) days after the Bid opening.
- 12.02 All Bidders are required to complete the M/WBE Participation Documents and submit the completed forms with its Bid.
- 12.03 All questions regarding M/WBE documents or requirements may be directed to the OWASA Project Manager, Darren Berger at dberger@owasa.org.
- 12.04 Orange Water and Sewer Authority reserves the right to reject a proposed Subcontractor for reasonable cause.

- 12.05 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work, if required by the Bidding Documents to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.05 Article 7 of the General Conditions and/or the Proposal section, require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Orange Water and Sewer Authority in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five (5) days after Bid opening, submit to Orange Water and Sewer Authority a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Orange Water and Sewer Authority. If Orange Water and Sewer Authority or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Orange Water and Sewer Authority may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, without an increase in the Bid price.
- 12.06 If apparent Successful Bidder declines to make any such substitution, Orange Water and Sewer Authority may Award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals, or entities. Declining to make requested substitutions will not constitute grounds of forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Orange Water and Sewer Authority or Engineer makes no written objection prior to giving of the Notice of Award will be deemed acceptable to Orange Water and Sewer Authority and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Article 7 of the General Conditions.
- 12.07 Subsequent to the submittal of the Bid, Orange Water and Sewer Authority may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, individual, or entity against which Contractor has reasonable objection.

ARTICLE 13 - PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents. All Bids must be submitted on the approved Bid Form furnished in the Bidding Documents. **DO NOT REMOVE ANY PAGES FROM THE BOUND DOCUMENTS.**
- A. The Lump Sum and/or Unit Price for specific items shall reflect all costs associated with furnishing, installing all items of Work as indicated on the Drawings and Technical Specifications, complete, in place and accepted, per the Engineer's Contract Documents, and any other agency having jurisdiction over the Project such as: Federal Aviation Administration (FAA), North Carolina Department of Transportation (NCDOT) Standards and Specifications, North Carolina Department of Environmental Quality (NCDEQ) Erosion and Sediment Control Planning and Design Manual, NCDENR – Public Water Supply (PWS), Town of Chapel Hill, and Orange Water and Sewer Authority.

- B. All blank spaces on the Bid Form shall be completed by printing in ink or by typewriter in both words and numerals, and the Bid Form signed in ink. Erasures or alterations shall be clearly initialed also in ink by the person signing the Bid Form. In case of a conflict between the price in words and its equivalent shown in numerals, the price in words shall take precedence. **PROPOSALS SHALL NOT BE CONDITIONAL, LIMITED OR RESTRICTED IN ANY WAY.**
 - C. A Bid Price shall be indicated for each lump sum or unit price bid item listed therein, or the words "No Bid," "No Change," or "Not Applicable" shall be entered.
 - D. The omission of prices for any item on the Bid Form, or the tendering of any unbalanced Bid, as determined by Orange Water and Sewer Authority, may be the cause for the rejection of the submitted Bid.
 - E. The estimated quantities contained on the Bid Form are for the purpose of comparing Bids. While the quantities are close approximations, they are not guaranteed. Payment will be made on the basis of the Work as actually executed at the unit prices set forth in the executed Agreement and under the provisions of such Agreement.
 - F. There shall be no additional compensation to the Bidder for materials, equipment, or Work that is incidental to the successful completion of the Contract. Incidental costs include the costs inherent to the complete installation of those individual items included on the Bid Form. For example, those costs associated with temporary electrical services, surveying, staking, deliveries and storage are incidental to the Project, and no additional payment will be made unless specifically indicated in the Bidding Documents.
 - G. Item values on the Bid Form shall be given as numerals (i.e. \$23,000.00) and in writing (i.e. Twenty-three thousand and no/100's dollars).
- 13.02 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. Insert the corporate officer's capacity under each signature. The corporate address and state of incorporation shall be shown below the signatures.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member in the presence of a witness with signature, and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown below the signature. Affix the limited liability company seal adjacent to the signatures.
- 13.04 A Bid by an individual or sole proprietorship shall be executed with a signature of the individual/sole proprietor in the presence of a witness with signature. Insert the words "Individual/Sole Proprietor" under the signature and show the Bidder's name and official address. Affix the individual/sole proprietor seal adjacent to the signature.
- 13.05 A Bid by a partnership shall be executed in the partnership name and signed by all partners (whose title must appear under the signature) in the presence of a witness with signature, accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signatures. Affix the partnership seal adjacent to the each partner signature.

- 13.06 A Bid by a joint venture shall be executed by each party of the joint venture under their respective seals in a manner appropriate to each such party as described above for each party type. Provide a single signature sheet for each party to the joint venture.
- 13.07 All names shall be typed or printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 The Postal and email address and telephone number for communication regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of the Bidder's authority and qualification to do business in the State of North Carolina or covenant to obtain such qualification prior to the award of the Contract. Bidders shall be licensed under Chapter 87 of the North Carolina General Statutes as a General Contractor. Bidder's State of North Carolina contractor license number shall also be shown on the Bid Form.
- 13.11 Minority and Women Business Enterprise Ordinance (M/WBE) Forms shall be submitted with the Bid, or the Bid may be considered non-responsive. Orange Water and Sewer Authority has adopted a minimum ten (10%) percent goal for participation by minority businesses in the total value of the Work for this Project in accordance with Section 143-128.2 of the General Statutes of North Carolina.

ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01 Lump Sum

- A. Bidders shall submit a Bid on a Lump Sum basis as set forth in the Bid Form.

14.02 Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed on the unit price section of the Bid Form.
- B. The "Bid Price" for each unit price Bid item will be the product of the "Estimated Quantity" for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and numerals will be resolved in favor of the words.
- D. The Bid Price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in Article 13 of the General Conditions.
- E. Bid prices will be compared after adjusting for differences in the time designated by Bidders for Substantial Completion. The adjusting amount will be determined at the rate set forth in the Contract Documents as Liquidated Damages for failing to achieve

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

Substantial Completion and/or Final Completion for each and every day after the time allowed, as set forth in the Agreement.

ARTICLE 15 - SUBMITTAL OF BID

- 15.01 Bidders shall be solely responsible for delivery of Bids in the required manner and time.
- 15.02 No Bid shall be accepted or considered unless the complete set of required and executed documents is included with the Bidder's submittal.
- 15.03 Each Bid shall include Non-Collusion Affidavits for the Bidder. Affidavits for all Subcontractors of the apparent Successful Bidder, and those Bidders requested by Orange Water and Sewer Authority, must be filed within five (5) days after the Bid opening. Blank Non-Collusion Affidavit Forms can be found in the Proposal section.
- 15.04 A Bid shall be received no later than the date and time prescribed and at the place indicated in the Section 00 11 16 - Advertisement for Bids, and shall be enclosed in an opaque sealed envelope plainly marked with the following information:
1. CIP No.: _____
 2. Project: _____
 3. Name of Bidder: _____
 4. Address of Bidder: _____

 5. Phone Number of Bidder: _____
 6. Contact Person for Bidder: _____
 7. Phone Number of Contact: _____
 8. Bidder's North Carolina General Contractor's License Number: _____
 9. The above-name Bidder has enclosed, and checked as appropriate, the following items in the Bid (check all):
 1. _____ Bid Form
 2. _____ M/WBE Forms
 3. _____ Non-Collusion Affidavit of Bidder
 4. _____ Bid Security
 5. _____ List of Bidder's Equipment and Personnel
- 15.05 Incorrect information, incomplete information, or irregularities on the Bid envelope may be cause for a Bid to be declared invalid or non-responsive. Invalid or non-responsive Bids will not be opened.
- 15.06 Bids received after the time listed in the Advertisement for Bids or Proposal will be returned to the Bidder unopened. The official time piece is the mobile phone of the OWASA project manager, Darren Berger.

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

- 15.07 If a Bid is sent by mail it should be registered mail. The sealed envelope containing the Bid shall be enclosed in a separate mailing/delivery envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to:

Bill Rosa
Project Manager
Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, North Carolina 27510

If a Bid is sent by air/ground special delivery, express delivery, etc. (e.g. FEDEX, UPS, etc.) shall be marked as indicated above and should be addressed to:

Bill Rosa
Project Manager
Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, North Carolina 27510

Mark envelope with the Project title and Contract number in the lower left-hand corner. Bids sent by mail or express air/ground delivery and arriving after the time for opening of Bids shall not be considered as valid Bids. **SPECIAL NOTE: If the Bidder chooses delivery of the Bid by means other than in person, neither Orange Water and Sewer Authority nor the Engineer assumes responsibility for delivery to the Bid opening.** In such instances, the Bidder shall have no claim against Orange Water and Sewer Authority or Engineer.

Bidders are reminded that if they are delivering bids via FedEx/UPS, USPS, or other means of delivery, bids should arrive no less than 24 hours prior to bid opening. The official time piece is the mobile phone of the OWASA Project Manager, Darren Berger.

- 15.08 Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may be declared unacceptable at Orange Water and Sewer Authority's sole discretion.
- 15.09 Bid Forms, appendices, and enclosures which are improperly prepared may be declared unacceptable at Orange Water and Sewer Authority's sole discretion.
- 15.10 Failure to provide security deposit, bonds, or insurance requirements will invalidate the Bid and therefore be considered non-responsive at Orange Water and Sewer Authority's sole discretion.

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01, and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 No Bidder may withdraw a Bid after Bid opening and prior to the conclusion to the period of time stated in the Bid Form except to the extent, if any, that may be required by law. Negligence on the part of the Bidder in preparing its Bid confers no right for the withdrawal of the Bid, after it has been opened.

ARTICLE 17 - OPENING OF BIDS

- 17.01 Bids shall be opened, unless obviously non-responsive, at the time and place indicated in the Advertisement for Bids or Proposal, unless obviously non-responsive, and read aloud publicly. An abstract of the amounts of the Bids, and major alternates, if any, will be made available to Bidders after the opening of Bids.
- 17.02 Bidders may be present at the opening of Bids, but it is not required.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Orange Water and Sewer Authority reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, unbalanced, or conditional Bids. Orange Water and Sewer Authority further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Orange Water and Sewer Authority may also reject the Bid of any Bidder if Orange Water and Sewer Authority believes that it would not be in the best interest of the Project to make an Award to that Bidder. Orange Water and Sewer Authority also reserves the right to waive any or all informalities not involving price, time, or changes in the Work, and to negotiate terms with the Successful Bidder.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.03 In evaluating Bids, Orange Water and Sewer Authority will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid form or prior to the Notice of Award.
- 19.04 In evaluating whether a Bidders is responsible, Orange Water and Sewer Authority will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for

those portions of the Work for which the identity of Subcontractors, Supplies, and other individuals or entities must be provided as provided in the Bidding Documents.

- 19.05 Orange Water and Sewer Authority may conduct such investigations as it deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.
- 19.06 If the Contract is to be Awarded, Orange Water and Sewer Authority will award the Contract to the Bidder whose Bid is determined by Orange Water and Sewer Authority to be in the best interest of the Project.
- 19.07 Notice of Award or notice of intent to Award will not constitute a Contract binding on Orange Water and Sewer Authority and will not obligate Orange Water and Sewer Authority to enter into a Contract with the Bidder. Orange Water and Sewer Authority will not be legally bound before Orange Water and Sewer Authority executes and delivers to the Bidder a written Contract.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 6 of the General Conditions sets forth Orange Water and Sewer Authority requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Orange Water and Sewer Authority, it shall be accompanied by such required bonds and insurance documentation.

ARTICLE 21 - SIGNING OF AGREEMENT

- 21.01 After Orange Water and Sewer Authority has identified the Successful Bidder, Orange Water and Sewer Authority will issue to the Successful Bidder, a written Notice to Award.
- 21.02 Orange Water and Sewer Authority will give the apparent successful Bidder a Notice of Award within or ninety (90) calendar days after the day of the Bid opening. When Orange Water and Sewer Authority gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts to the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within fifteen (15) calendar days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement and attached documents to Orange Water and Sewer Authority. Within ten (10) days after execution of the Agreement by the Orange Water and Sewer Authority Board of Directors, Orange Water and Sewer Authority will deliver one fully executed counterpart to Successful Bidder.
- 21.03 Failure or refusal of the Bidder whose Bid is accepted to execute the Contract as hereinbefore provided shall constitute a breach by such Bidder of the Contract created by the acceptance of the Bid, and in such event, Orange Water and Sewer Authority at its option, may determine that such Bidder has abandoned the Contract. Thereupon such Bidder's Bid and the acceptance thereof shall be null and void. It is understood by the Bidder, in the event of the annulment of the Award, that the amount of the Bid

security submitted with the Bid shall be forfeited to Orange Water and Sewer Authority, not as a penalty, but as Liquidated Damages.

ARTICLE 22 - SALES AND USE TAXES

- 22.01 The North Carolina General Assembly adopted legislation which required that Contractors pay North Carolina Sale and Use Tax on materials, supplies, fixtures, and equipment used by the Bidder in the performance of contracts with cities, counties, and towns on Contracts dated July 1, 1961 or later. This requirement also applies to Orange Water and Sewer Authority in order that Orange Water and Sewer Authority may recover the amount of tax permitted under the law.
- 22.02 The following procedure in handling the North Carolina Sales Tax is applicable to this Contract. Contractor(s) shall comply fully with the requirements outlined hereinafter, in order that the Orange Water and Sewer Authority may recover the amount of tax permitted under the law.
- A. It shall be the Contractor's responsibility to furnish Orange Water and Sewer Authority documentary evidence showing the materials used and sales tax paid by the Contractor and each of its Subcontractors with each payment request in a format approved by Orange Water and Sewer Authority.
 - B. The documentary evidence shall consist of a certified statement, by the Contractor and each of his Subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes paid each vendor. Certified statements must show the invoice number or numbers, covered and inclusive dates of such invoices.
 - C. Materials used from the Contractor's or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
 - D. The Contractor shall not be required to certify the Subcontractor's statements.
 - E. The documentary evidence to be furnished to Orange Water and Sewer Authority eligible for sales or use tax refunds covers sales and/or use taxes paid on building materials used by Contractor(s) and Subcontractors in the performance of Contracts with churches, orphanages, hospitals not operated for profit and other charitable or religious institutions or organizations not operated for profit and, incorporated cities, towns, and counties in this State. The documentary evidence is to be submitted to the above-named institutions, organizations and governmental units to be included in claims for refunds to be prepared and submitted by them to obtain refunds provided by G.S. 105-164.14(2) and (3) of the 1961 Statute, and is to include the purchases of building materials, supplies, fixtures, and equipment which become a part of or annex to buildings or structures being erected, altered or repaired under Contracts with such institutions, organizations or governmental units.
- 22.03 The Bidder shall include North Carolina Sales and Use Tax in its Bid.

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

-END OF DOCUMENT-

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

DOCUMENT 00 41 44

PROPOSAL

(UNIT PRICE CONTRACT - BID FORM)

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

EXECUTIVE DIRECTOR
ORANGE WATER AND SEWER AUTHORITY
400 JONES FERRY ROAD
CARRBORO, NORTH CAROLINA 27510
(919) 968-4421

Date: _____, 20__

OWASA CIP: #375-02

Project: **Burning Tree Water Line Replacement**

Name of Bidder: _____

Address of Bidder: _____

Phone Number of Bidder: _____

Contact Person for Bidder: _____

Phone Number of Contact: _____

Bidder's NC General Contractor's License Number (required): _____

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

1.03 The undersigned Bidder hereby declares that the names of all persons interested in this Bid as principals appear in the blank spaces hereinafter provided for such purpose, that this Bid is in all respects fair and without collusion, that the Bidder has examined the locations of the proposed Work, the Advertisement to Bidders, the Instructions to Bidders, Technical Specifications, M/WBE requirements of Orange Water and Sewer Authority, the Contract Documents and Bond forms, and the Drawings therein referred to and fully understands the same and agrees and accepts the terms and conditions thereof, that it is understood that the estimated quantities are approximate only and

Proposal – Unit Price Contract Bid Form

00 41 44-1

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

are given for the purpose of comparing Bids upon a uniform basis, and that said estimate shall in no way affect the unit prices for the Work.

- 1.04 The undersigned Bidder hereby agrees to furnish at the Bidder's cost the expense of all the necessary labor, tools, apparatus, machinery, equipment, transportation, and all other things which may be required to fully and properly perform all the terms, covenants, provisions, and agreements of this Contract.
- 1.05 The undersigned Bidder hereby agrees to do said Work and furnish said materials as prescribed in the Contract Documents and Technical Specifications, and, according to the Drawings and requirements of the Engineer under said Contract Documents and Technical Specifications, in a first-class manner and to the best of the undersigned's ability at the following lump sum or unit prices.
- 1.06 The undersigned Bidder has examined the Site of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by the Engineer for the Project, we, the undersigned Bidder, hereby offers to enter into a Contract to perform the Work for the lump sum or unit prices listed in this Bid Form in lawful money of the United States of America.
- 1.07 The undersigned Bidder acknowledges that it is the intent of these Contract Documents to obtain a Contract based on a **Unit Price Bid**, unless Lump Sum Prices are applied to the various portions of the Work and are specifically requested. In the event of errors in the arithmetical extension of unit prices to total prices, the unit price bid shall govern, and the Award of the Contract shall be based on the recomputed total prices. Where discrepancy exists between words and numerals, the written words shall govern. If a Bidder submits a Bid showing a unit price for a particular item and omits an extended total for that item, or a Bidder submits a Bid showing an extended total for a particular item and omits a unit price for that item, the omitted numbers shall be computed using the equation "Estimated Quantity x Unit Bid Price = Extended Total", so that the omission shall not render the Bid non-responsive or incomplete. If the Bidder leaves blank any lines or spaces indicated for the dollar amount of any item in the Bid, that omission will be understood and treated as if the Bidder had written in zero dollars (\$0.00) for that particular item in the Bid. Before applying the preceding two (2) sentences this paragraph, the following rule shall apply in the special case that it describes: In places where it is indicated that a Bid should show both words and numerals for a particular dollar amount, if the Bid shows the dollar amount in numerals but omits to show any dollar amount in words (or vice versa), the Bid shall be treated as if it had shown the indicated dollar amount in both numerals and words.
- 1.08 The undersigned Bidder shall be required to submit a complete detailed cost breakdown of Lump Sum Bid items for payment purposes, for approval by the Engineer, prior to the Award of the Contract.
- 1.09 The undersigned Bidder acknowledges that all costs for mobilization, demobilization, bonds, insurance, etc. shall be included in the Unit Price Bid indicated. There shall be no additional compensation for mobilization, demobilization, bonds, insurance, etc and no adjustments to the Bid based on changes in the Scope of Work, including but not limited to, any additions to the Work on the Contract.



- 1.10 The undersigned Bidder acknowledges that the Project will be Awarded to the lowest responsible, responsive Bidder for the Project, as selected by Orange Water and Sewer Authority whose evaluation indicates that the Award will be in the best interest of the Project.
- 1.11 The undersigned Bidder acknowledges that all blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid Price shall be indicated for the Lump Sum or each Unit Price item listed therein, or the words, "No Bid", "No Change", or "Not Applicable" entered."
- 1.12 The undersigned Bidder acknowledges that the omission of prices for any item on the Bid Form, or the tendering of any unbalanced Bid may be the cause for the rejection of the submitted Bid.
- 1.13 The undersigned Bidder acknowledges that the payment will be made on the basis of the Work as actually executed at the Unit Prices or Lump Sum Prices set forth in the executed Contract and under the provisions of such Contract.
- 1.14 The undersigned Bidder acknowledges that there shall be no additional compensation to the Bidder for materials, equipment, or Work that is incidental to the successful completion of the Contract. Incidental costs include the costs inherent to the complete installation of those individual items included on the Bid Form.
- 1.15 The undersigned Bidder acknowledges that the Non-Collusive Affidavit for the Contractor shall be submitted with the Bid, and Non-Collusive Affidavit(s) for all Subcontractors (all tiers) for the apparent low Bidder shall be submitted within five (5) calendar days of the Bid Opening.
- 1.16 The undersigned Bidder acknowledges that it has included the Bid security as required by the Instruction to Bidders.
- 1.17 The undersigned Bidder agrees to comply with all requirements of local, State, or Federal permits that may be required for the completion of the Work.
- 1.18 The undersigned Bidder shall have all proper Contractors licenses and privilege licenses required under State and local laws governing their respective trade(s).
- 1.19 The undersigned agrees that the rights of Orange Water and Sewer Authority and the recommendations of the Engineer are not to be questioned in the Award of a Contract.
- 1.20 The undersigned Bidder certifies compliance with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes ("E-Verify"), and represents that it will require any subcontractors to comply with the requirements of Article 2 of Chapter 64 of the General Statutes.
- 1.21 The undersigned Bidder certifies compliance with the requirements of Article 6 of Chapter 143 of the North Carolina General Statutes ("Iran Divestment") and that it is not listed on the State Treasurer's Final Divestment List found at the website address www.nctreasurer.com/Iran and updated every 180 days, and represents that it will require any subcontractors to comply with the requirements of Article 6 of Chapter 143 of the General Statutes.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

Proposal – Unit Price Contract Bid Form

00 41 44-3

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

- 2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid shall remain open and remain subject to acceptance, and is irrevocable, except as required by law, for ninety (90) calendar days from the Bid opening date, or for such longer period of time that Bidder may agree to in writing upon request of Orange Water and Sewer Authority.
- 2.02 If this Bid is accepted by Orange Water and Sewer Authority within the time period stated above, the Bidder will:
- Execute the Agreement within fifteen (15) days of receipt of Notice of Award.
 - Furnish the required Bonds within fifteen (15) days of receipt of Notice of Award.
 - Commence Work within ten (10) days after written Notice to Proceed.
- 2.03 If this Bid is accepted by Orange Water and Sewer Authority within the time stated, and the Bidder fails to commence the Work or fails to provide the required bonds, the Bid security shall be forfeited as damages to Orange Water and Sewer Authority by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this Bid and the Bid upon which a Contract is signed.
- 2.04 In the event Bid is not accepted by Orange Water and Sewer Authority within the time stated above, the required Bid security will be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.:

Addendum Date:

_____	_____
_____	_____
_____	_____
_____	_____

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

Proposal – Unit Price Contract Bid Form

00 41 44-4

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

"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;

Proposal – Unit Price Contract Bid Form

00 41 44-5

Burning Tree Water Line
Replacement



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

“fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Orange Water and Sewer Authority, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Orange Water and Sewer Authority of the benefits of free and open competition;

“collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Orange Water and Sewer Authority, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

“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.

ARTICLE 5 – BASIS OF BID (UNIT PRICE BID)

5.01 CIP: **#375-02**

Project: **Burning Tree Water Line Replacement**

Project Description:

Complete and operable installation of approximately 4,634 linear feet of 8-inch restrained joint polywrapped ductile iron water pipeline from the intersection of Raleigh Road and Burning Tree Drive through the intersection of Burning Tree Drive and Pinehurst Drive..

Installation of approximately 831 linear feet of 2-inch SDR 17 PVC water main and 90 linear feet of 2-inch type “K” hard copper water main to be installed via open cut.

Installation of all temporary and new permanent water services and interconnections, required to install complete and operable water lines meeting local requirements and requirements as described in the contract documents.

Abandonment of approximately 5,470 linear feet of 8-inch AC water pipe by cellular concrete or grout fill.

Applicable traffic control, restoration, erosion and sediment control, permitting, and other items required to meet local requirements and requirements as described in the contract documents.

The foregoing description shall not be construed as a complete description of all Work required.

The Unit Price Bid shall reflect all costs associated with furnishing and installing, and placing into service all items of Work as indicated on the Drawings and in the Technical Specifications, complete, in place, operable and accepted by Orange Water and Sewer Authority, per the Engineer’s Contract Documents.

5.02 Orange Water and Sewer Authority has established a “Contingency Allowance” for this project. The contingency allowance is intended to provide adequate budget to cover items not precisely

Proposal – Unit Price Contract Bid Form

00 41 44-6

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

determined by Orange Water and Sewer Authority, and unforeseeable conditions prior to the Bid. Orange Water and Sewer Authority has provided for a contingency allowance specified in the CONTINGENCY ALLOWANCE paragraph of Article 5.01. Funds allocated as part of the allowance will be used *at the sole discretion of Orange Water and Sewer Authority*. This allowance is included on the Bid Form in the Proposal, and will be included in the total amount of each Bid. Orange Water and Sewer Authority shall approve use of the contingency allowance funds prior to any Work associated with a contingency allowance being performed. The Contractor shall invoice items authorized for payment under the Contingency Allowance with its monthly pay applications. The amount invoiced will be deducted from the indicated amount.

- 5.03 Bidder shall complete the Work in accordance with the Contract Documents for the following
TOTAL UNIT PRICE BID:

REMAINDER OF PAGE LEFT BLANK INTENTIONALLY



CIP NO.: 375-02
 PROJECT: Burning Tree Water Line Replacement
 DATE: April 2026

BID FORM

NOTE TO BIDDERS: DO NOT REMOVE THIS BID FORM
FROM THE CONTRACT DOCUMENTS

UNIT PRICE BID CONTRACT

BASE BID

Item	Description	Estimated Quantity		Bid Unit Price		Total Bid Price
1	Mobilization and Demobilization (max. 3%)	1	LS	\$	/LS	\$
2	Traffic and Pedestrian Control	1	LS	\$	/LS	\$
Water Main Replacement						
3	8" Ductile Iron Water Main, Class 350 Restrained Joint w/ Polywrap	4,700	LF	\$	/LF	\$
4	6" Ductile Iron Water Main, Class 350 Restrained Joint w/ Polywrap	20	LF	\$	/LF	\$
5	2" SDR 17 PVC Water Main	840	LF	\$	/LF	\$
6	2" Type "K" Hard Copper Water Main	90	LF	\$	/LF	\$
7	Testing, Seeding, and Restoration for Water Mains					
a	8" Diameter	4,700	LF	\$	/LF	\$
b	6" Diameter	20	LF	\$	/LF	\$
c	2" Diameter	930	LF	\$	/LF	\$
8	Ductile Iron Restrained Mechanical Joint Fittings Installed On New Water Mains					
a	Horizontal Fittings	2,000	LB	\$	/LB	\$
b	Vertical Fittings	500	LB	\$	/LB	\$
9	Resilient Wedge Gate Valve with Valve Box					
a	8" Diameter	17	EA	\$	/EA	\$
b	2" Diameter (including tap, saddle, and brass nipple)	3	EA	\$	/EA	\$
10	Connect to Existing Water Main with 8" Insertion Valve Restrained Using Valve Brace with Valve Box	3	EA	\$	/EA	\$
11	Connect to Existing Water Main with 6" Insertion Valve Restrained Using Valve Brace with Valve Box	1	EA	\$	/EA	\$
12	Connection to Existing 8-inch Water Main via Cut-in 8-inch Resilient Wedge Gate Valve with Valve Box	1	EA	\$	/EA	\$
13	2-inch Permanent Blow Off Assembly	8	EA	\$	/EA	\$
14	Fire Hydrant Assembly	4	EA	\$	/EA	\$
15	2" Air Release Valve in Manhole	1	EA	\$	/EA	\$

Proposal – Unit Price Contract Bid Form

00 41 44-8

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
 PROJECT: Burning Tree Water Line Replacement
 DATE: April 2026

Item	Description	Estimated Quantity		Bid Unit Price		Total Bid Price
16	New 3/4" or 1" Water Service including Tap, Corporation Stop, Pipe, Meter Setter and Meter Box (complete)					
a	Same Side as Main (Open-Cut)	25	EA	\$	/EA	\$
b	Opposite Side from Main (Trenchless)	27	EA	\$	/EA	\$
Abandonment, Restoration, Miscellaneous						
17	Remove Existing Fire Hydrant Assembly	4	EA	\$	/EA	\$
18	Abandon Existing 8-inch AC Water Main with Grout Fill	5,470	LF	\$	/LF	\$
19	Cut and Cap Existing Water Main					
a	8" Diameter	3	EA	\$	/EA	\$
b	6" Diameter	1	EA	\$	/EA	\$
20	Abandon Existing Valve Box In-Place	15	EA	\$	/EA	\$
21	Remove Existing 8" Water Main	30	LF	\$	/LF	\$
22	Remove and Replace Existing Storm Drain Crossings as Needed for Construction					
a	30" RCP	40	LF	\$	/LF	\$
b	24" RCP	20	LF	\$	/LF	\$
c	18" RCP	30	LF	\$	/LF	\$
23	Remove and Replace Concrete Curb & Gutter	3,450	LF	\$	/LF	\$
24	Remove and Replace Town of Chapel Hill Asphalt Roadway/Trench Repair (6" ABC + 5"119.0B + 1"SF9.5A)	2,500	SY	\$	/SY	\$
25	Undercut Excavation and Disposal of Unsuitable Material	100	CY	\$	/CY	\$
26	Remove Unsuitable Excavated Material and Replace with Select Material	500	CY	\$	/CY	\$
27	Separation/Protection Excavatable Flowable Fill	30	CY	\$	/CY	\$
28	Remove and Replace Speed Hump	2	EA	\$	/EA	\$
29	Straw Wattle Inlet Protection Devices	16	EA	\$	/EA	
30	Allowances					
a	TOCH Engineering Fee Allowance	1	LS	\$ 15,000.00	/LS	\$ 15,000.00
b	Contingency Allowance	1	LS	\$ 25,000.00	/LS	\$ 25,000.00
TOTAL BASE BID (BID ITEMS 1-30)						\$



CIP NO.: 375-02
 PROJECT: Burning Tree Water Line Replacement
 DATE: April 2026

ALTERNATES

Item	Description	Estimated Quantity		Bid Unit Price		Total Bid Price
ALT-1						
1	Temporary 2" HDPE (DR 9) Water Main	215	LF	\$	/LF	\$
2	Temporary Water Service Connections (complete)					
a	3/4" or 1" Temporary Water Service	2	EA	\$	/EA	\$
TOTAL ALT-1 (BID ITEMS 1-2)						\$
TOTAL BASE BID + ALT-1						\$

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

TOTAL UNIT PRICE BID for the Project described in Sub-Article 5.01, complete as indicated by the Contract Documents (in words and numerals):

_____ Dollars
 and _____ Cents (\$ _____)

Bidder _____
 (Print Name)

Bidder _____
 (Signature)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

**CERTIFIED LIST OF EQUIPMENT/MATERIAL
MANUFACTURERS AND SUBCONTRACTORS**

The Bidder, _____, as part of the procedure for the submission of Bids on this Project, submits the following list of Equipment/Material Manufacturers and Subcontractors to be used in the performance of Work to be done on said Project. The list of Manufacturers and all equipment/materials furnished and Subcontractors shall be based on requirements of the Contract Documents. Changes to this list after the Bid opening shall only be as approved by Orange Water and Sewer Authority upon request by the Contractor or as required by Orange Water and Sewer Authority based upon review of Contractor's submittals:

EQUIPMENT/MATERIALS	MANUFACTURER
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

WORK TASK	SUBCONTRACTOR
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

It is understood and agreed that, if awarded a Contract, the Contractor will not make any additions, deletions or substitutions to this certified list without the written consent of Orange Water and Sewer Authority.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CERTIFICATION AFFIDAVIT

THE ABOVE INFORMATION IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER UNDERSTAND AND AGREE THAT, IF AWARDED A CONTRACT, THIS CERTIFICATION SHALL BE ATTACHED THERETO AND BECOME A PART THEREOF.

NAME OF SIGNER: _____
(Please Print or Type)

TITLE OF SIGNER: _____
(Please Print or Type)

SIGNATURE: _____
DATE: _____

-END OF CERTIFICATION-

REMAINDER OF PAGE LEFT BLANK INTENTIONALLY



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be Substantially Complete within **365 CONSECUTIVE CALENDAR DAYS**, after the date when the Contract Time commences to run as provided in Paragraph 4.01 of the General Conditions and will be completed and ready for final payment in accordance with Paragraph 15.03 of the General Conditions within **395 CONSECUTIVE CALENDAR DAYS**, of the date when the Contract Time commences to run.
- 6.02 Bidder accepts the provisions of the Agreement as to Liquidated Damages.

ARTICLE 7 - ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid Security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. List of Project References;
 - E. Evidence of authority to do business in the State of North Carolina; or a written covenant to obtain such license within the time for acceptance of Bids;
 - F. Required Bidder Qualification Statement with supporting data;

ARTICLE 8 – BID CERTIFICATION

- 8.01 THE ABOVE INFORMATION IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER UNDERSTAND AND AGREE THAT, IF AWARDED A CONTRACT, THIS CERTIFICATION SHALL BE ATTACHED THERETO AND BECOME A PART THEREOF.

SIGNATURE: _____

DATE: _____

- 8.02 We agree to diligently perform the Work in accordance with all Contract Documents, to complete such Work within the period as outlined in the Contract, and to begin Work within ten (10) consecutive calendar days after receipt of the Notice to Proceed from Orange Water and Sewer Authority.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 9 - CONTRACTOR EXPERIENCE

9.01 Not used

9.02 Not used

9.03 Not used

ARTICLE 10 - BID FORM SIGNATURES

10.01 Refer to Document 00 21 15 for specific Bid Form signature requirements for corporations, partnerships, limited liability companies, individuals, or sole proprietorships.

ARTICLE 11 - QUALIFICATIONS OF BIDDERS

11.01 Not used

ARTICLE 12 – SEQUENCE OF WORK [INSERT IF APPLICABLE OR INDICATED NOT USED]

12.01 Not used

12.02 Not used

12.03 Not used

12.04 Not used

12.05 Not used

12.06 Not used

ARTICLE 13 - INTERIM COMPLETION DATES

13.01 Not used



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CORPORATION

The Corporate Seal of

(Bidder - print the full legal corporate name of firm)

(President/Vice President/Authorized Corporate Officer)

(Seal)

was hereunto affixed in the presence of:

(Secretary/Assistant Secretary)

(Seal)

Corporate Address:

(State of Incorporation)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

LIMITED LIABILITY COMPANY

(Bidder - print the full legal name of firm)

(Authorized Firm Member)

(Seal)

was hereunto affixed in the presence of:

(Witness)

(Seal)

Firm Address:

(State of Formation)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

INDIVIDUAL OR SOLE PROPRIETORSHIP

(Bidder - print the full name of individual or sole proprietorship)

(Seal)

Individual or Sole Proprietorship Address:



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

PARTNERSHIP

(Bidder - print the full legal corporate name of partnership)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(Partner and Title)

(Seal)

(All Partners shall sign, additional signatures with titles and seals may be added below.)

was hereunto affixed in the presence of:

(Witness)

(Seal)

Partnership Address:



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

JOINT VENTURE

If the Bid is a joint venture, add additional forms of execution for each member of the joint venture in the appropriate manner using the forms from above.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

BID BOND

This is a Bid Bond that is subject to the provisions of G.S. 143-129 (b) of the North Carolina General statutes.

This Bond is executed on _____, 20____

The name of the Principal is _____
(Correct name of Contractor)

(A Corporation, a Partnership, or an Individual, as the case may be)

The name of the Surety is _____

Orange Water and Sewer Authority is the Owner.

The amount of the Bond is _____
_____ (Dollars) \$ _____

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

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

BURNING TREE WATER LINE REPLACEMENT

NOW, THEREFORE

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

BID BOND (CONTINUED)

Proposal – Unit Price Contract Bid Form
00 41 44-20

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

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

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

Execution by Principal:

**(If Contractor is a Partnership, all
partners should execute Bond below)**

ATTEST:

Principal Secretary
(SEAL)

BY: _____
Principal

Principal

Principal

Witness as to Principal

(Address)

(Phone Number)

Execution by Surety:

ATTEST:

N. C. Resident Agent
(SEAL)

Surety

(Address)

Witness as to Surety

(Phone Number)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

POWER OF ATTORNEY

(Attach)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

PROPOSAL SIGNATURE

Bidder operates under the legal name of _____

BIDDERS COMPLETE THE APPROPRIATE SECTION*

CORPORATION* The Bidder is a corporation, has a corporate seal and the full names of its officers are:

President _____

Secretary _____

Vice President _____

Treasurer _____

The _____ (officer's title) is authorized to sign construction proposals and contracts for the company by action of its Board of Directors taken on _____, 20____ a certified copy of which is attached. (Strike out previous sentence if not applicable. This section must be completed if President or Vice President is not the signatory party.)

PARTNERSHIP* The Bidder is a partnership consisting of individual partners whose full names are:

INDIVIDUAL* The Bidder is an individual whose full name is:

Print Name of Legal Entity

By: _____

Print name and title of signatory

CORPORATIONS ONLY – Secretary or Assistant
Secretary attest and affix corporate Seal:

Circle one: Secretary or Assistant Secretary

State of Incorporation

Address and telephone number

Subscribe and sworn to me this _____ day of _____, 20____.

Notary Public (Seal)

My Commission Expires: _____



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CONTRACTOR'S AFFIDAVIT OF ORGANIZATION AND AUTHORITY

STATE OF _____

COUNTY OF _____

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

(Fill Out Applicable Paragraph)

1. CORPORATION:

The Bidder is a corporation organized and existing under the laws of the State of _____ and its President is _____;

its Secretary is _____,

and it does have a corporate seal. The _____ (officer's title) is authorized to sign construction Contracts and Bids for the company by action of its Board of Directors taken on _____, 20____, a certified copy of which is hereto attached. (Strike out last sentence if not applicable.)

2. PARTNERSHIP:

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

3. INDIVIDUAL / SOLE TRADER:

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

4. ADDRESS:

The business address of the Bidder is as follows: _____

Its phone number is _____.

Bidder

By: _____

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

My commission expires: _____

Notary Public

(SEAL)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

NON-COLLUSION AFFIDAVIT FOR CONTRACTOR'S

STATE OF _____

COUNTY OF _____

_____ being first duly sworn,
deposes and says that:

- (1) He/She is the: _____
Owner, Partner, President, Vice President or other officer with evidence of authority attached
of _____
the Bidder that has submitted the attached BID;
- (2) He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such BID is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired; connived or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

BY: _____

ITS: _____
Title

CORPORATIONS ONLY

Secretary or Assistant, attest & affix corporate seal

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

_____ My commission expires: _____

Notary Public (SEAL)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

NON-COLLUSION AFFIDAVIT FOR SUBCONTRACTOR(S)
(DUE WITHIN 5 DAYS OF THE BID OPENING)

STATE OF _____

COUNTY OF _____

_____ being first duly sworn,
deposes and says that:

- (1) He/She is _____ of _____, hereinafter referred to as the "Subcontractor";
- (2) He/She is fully informed respecting the preparation and contents of the Subcontractor's Proposal submitted by the Subcontractor to _____, the Contractor for certain work in connection with the _____ Contract pertaining to the Project in _____ (City or County, and State);
- (3) Such Subcontractor's Proposal is genuine and is not a collusive or sham proposal;
- (4) Neither the Subcontractor nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Proposal in connection with such Contract or to refrain from submitting a Proposal in connection with such Contract, or has in any manner, directly or indirectly, sought by unlawful agreement or connivance with any other Bidder, firm or person to fix the price or prices in said Contractor's Proposal, or to fix any overhead, profit or cost element of the price or prices in said Contractor's Proposal, or to secure through collusion, conspiracy connivance or unlawful agreement any advantage against the _____ (Local Public Agency) or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the Subcontractor's Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

(Signed) _____

Title

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

_____ My commission expires: _____

Notary Public

(Seal)



EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION

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

- a. The Contractor will not discriminate against any employee or applicant because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to race, color, religion, sex, or national origin. Such action shall include but not be limited to the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause.
- b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- c. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract understanding, a notice; to be provided, advising the labor union or worker's representative of the Contractor's commitments under the Equal Employment Opportunity Section of this Contract, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- d. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Owner Contracts,
- e. The Contractor will include the provisions of this section in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Owner so that such provisions will be binding upon each Subcontractor or vendor.

(Complete this section for signatures by a CORPORATION):

(CORPORATE SEAL)

Corporate Name

ATTEST:

Secretary* or Assistant Secretary*

BY:

President* or Vice President*

*choose one

(Complete this section for signatures by PARTNERSHIP and INDIVIDUAL):

WITNESS:

BY:

(Seal)

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



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

**ACKNOWLEDGEMENT FOR
EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION**

Corporate Acknowledgement

(Use this portion of the form for acknowledgement of signature by a Corporation):

STATE OF _____

COUNTY OF _____

I, the undersigned notary public, do hereby certify that _____
personally appeared before me this day and acknowledged that he/she is *Secretary* or Assistant Secretary** of _____,
a corporation, and that by authority duly given and as the act of the corporation, the foregoing instrument
was signed in its name by its *President* or Vice President**, sealed with its corporate seal, and attested
by himself as its *Secretary* or Assistant Secretary**.

**choose one*

WITNESS my hand and notarial seal this _____ day of _____, 20____

My commission expires _____.
(SEAL)

Notary Public

Individual or Partnership Acknowledgement

(Use this portion of the form for acknowledgement of signature by a partnership or an individual.)

NORTH CAROLINA

(Enter correct State and County if different than
shown.)

_____ COUNTY

I, the undersigned Notary Public, do hereby certify that, _____
personally appeared before me this day and acknowledged the due execution of the foregoing
instrument.

WITNESS my hand and notarial seal this _____ day of _____, 20____

My commission expires: _____.

Notary Public (SEAL)



MINORITY BUSINESS PARTICIPATION

Provide with the Bid:

Under GS 143-128.2(c) the undersigned Bidder shall identify on its Bid Proposal the minority businesses that it will use on the Project and the total dollar value of the bid that will be performed by the minority businesses and list the good faith efforts (**Affidavit A**) made to solicit participation. A Contractor that performs all of the Work with its own workforce may submit an **Affidavit B** to that effect in lieu of **Affidavit A** required above.

After the Bid opening:

Orange Water and Sewer Authority will consider all bids and alternates, and determine the lowest responsible, responsive Bidder. Upon notification of being the apparent low Bidder, the Bidder shall then file within 72 hours of the notification of being the apparent lowest Bidder, the following:

An **Affidavit C** that includes a description of the portion of Work to be executed by minority businesses, expressed as a percentage of the total Contract Price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the Bidder has made the required good faith effort; or **Affidavit D** of its good faith effort to meet the goal. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

These forms are included herein:

- (1) Identification of Minority Business Participation
- (2) Affidavit A – Listing of the Good Faith Effort
- (3) Affidavit B – Intent to Perform Contract with Own Workforce
- (4) Affidavit C – Portion of Work to be Performed by Minority Firms
- (5) Affidavit D – Good Faith Efforts



DATE: April 2026

I, _____,
(Name of Bidder)

[illegible]

The total value of minority business contracting will be (\$)_____

Burning Tree Water Line Replacement



Orange Water & Sewer Authority

State of North Carolina AFFIDAVIT A – Listing of the Good Faith Efforts

County of _____

Affidavit of _____ (Name of Bidder)

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 (NC Administrative Code 01 NCAC 30I .0102)

- ☐ **1 – (10 pts)** Contacting 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 or proposal date and notifying them of the nature and scope of the work to be performed.
- ☐ **2 – (10 pts)** Making 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 bid or proposals are due.
- ☐ **3 – (15 pts)** Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- ☐ **4 – (10 pts)** Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☐ **5 – (10 pts)** Attending any prebid meetings scheduled by the public owner.
- ☐ **6 – (20 pts)** Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
- ☐ **7 – (15 pts)** Negotiating in good faith with interested minority businesses and not rejecting 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)** Providing 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. Assisting 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)** Negotiating 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)** Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

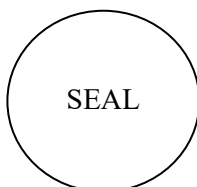
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the OWNER. Substitution of contractors must be in accordance with GS 143-128.2(d). 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 business commitment and is authorized to bind the BIDDER to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

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

Notary Public _____ My commission expires _____

Proposal – Unit Price Contract Bid Form

00 41 44-31

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

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 _____

(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

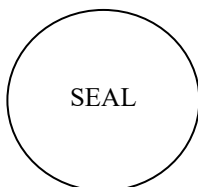
The Bidder agrees to provide any additional information or documentation requested by the Owner in support of the above statement.

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: _____



State of North Carolina, County of _____

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

Notary Public _____

My commission expires _____

AFFIDAVIT C – Portion of the Work to be Performed by Minority Firms

County of _____

***** (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) *****

If the portion of the Work to be executed by minority businesses as defined in G. S. 143-128.2(g) is **equal to or greater than 10%** 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. Minority 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	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

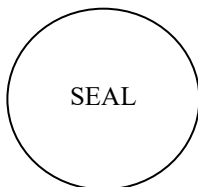
Pursuant to G. S. 143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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: _____



State of North Carolina, County of _____

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

Notary Public _____

My commission expires _____

Proposal – Unit Price Contract Bid Form

00 41 44-33

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: March 2026

AFFIDAVIT D – Good Faith Efforts

County of _____

***** (NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL) *****

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of: _____

(Name of Bidder)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American, Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions.

Examples of documentation include, but are not limited to, the following evidence:

- 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.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: March 2026

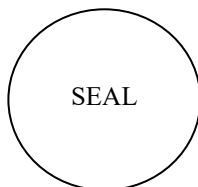
AFFIDAVIT D – Good Faith Efforts (continued)

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.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

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

Notary Public _____

My commission expires _____

-END OF DOCUMENT-



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

DOCUMENT 00 52 15

AGREEMENT

THIS AGREEMENT is dated as of the ____ day of _____, in the year 20____ by and between Orange Water and Sewer Authority, Carrboro, North Carolina, party of the first part, and _____ party of the second part, (Contractor).

Orange Water and Sewer Authority and Contractor, in consideration of the mutual covenants set forth herein, 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:

Complete and operable installation of approximately 4,634 linear feet of 8-inch restrained joint polywrapped ductile iron water pipeline from the intersection of Raleigh Road and Burning Tree Drive through the intersection of Burning Tree Drive and Pinehurst Drive..

Installation of approximately 831 linear feet of 2-inch SDR 17 PVC water main and 90 linear feet of 2-inch type "K" hard copper water main to be installed via open cut.

Installation of all temporary and new permanent water services and interconnections, required to install complete and operable water lines meeting local requirements and requirements as described in the contract documents.

Abandonment of approximately 5,470 linear feet of 8-inch AC water pipe by cellular concrete or grout fill.

Applicable traffic control, restoration, erosion and sediment control, permitting, and other items required to meet local requirements and requirements as described in the contract documents.

The foregoing description shall not be construed as a complete description of all work required.

ARTICLE 2 - THE PROJECT

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

OWASA CIP: #375-02, Project: Burning Tree Waer Line Replacement



ARTICLE 3 - ENGINEER

- 3.01 The Project has been designed by McKim & Creed, Inc., who is to act as Orange Water and Sewer Authority's representative assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIME

4.01 Time of the Essence

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

4.02 Contract Times: (Consecutive Calendar Days)

- A. Days to achieve Substantial Completion, Final Completion, and Final Payment:

The Work shall be Substantially Complete in accordance with Paragraph 15.03 of the General Conditions within **365 CONSECUTIVE CALENDAR DAYS**, after the date when the Contract Time commences to run (Notice to Proceed), and Finally Complete and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **395 CONSECUTIVE CALENDAR DAYS** after the date when the Contract Times commence to run (Notice to Proceed).

- B. Parts of the Work shall be substantially completed on or before the following Milestone(s): Milestones are not included in this contract.
- C. Bidder accepts the provisions of the Agreement as to Liquidated Damage.

4.03 Liquidated Damages

- A. The Contractor and Orange Water and Sewer Authority recognize that time is of the essence for this Agreement and that the Orange Water and Sewer Authority will suffer financial and other losses if the Work is not completed within either or both the time of Substantial Completion and the time of Final Completion as specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expenses, and difficulties to both parties involved in proving or contesting in a legal or mediation preceding the actual loss suffered by Orange Water and Sewer Authority, if the Work is not completed on time. Accordingly, instead of requiring any such proof of losses, it is agreed that the Contractor shall be liable for and pay the following amounts to Orange Water and Sewer Authority as Liquidated Damages, and not as a penalty:

Completion Milestone Date	Liquidated Damages (per day)
Date of Substantial Completion	\$1,500
Date of Final Completion	\$1,500



- B. Liquidated damages will be assessed for the above listed amounts for each and every day the Work remains incomplete beyond the date of Substantial Completion and the date of Final Completion, either date being independent of the other.
- C. Not used
- D. Not used
- 4.04 Failure of the Contractor to commence construction within ten (10) consecutive calendar days of the Notice to Proceed shall begin a daily penalty to the Contractor at a rate of fifty percent (50%) of the daily Liquidated Damages specified in Paragraph 4.03.A.
- 4.05 Weather Related Delays

- A. Contractor's requests to extend Contract Time based on weather related delays shall be made in writing and shall be made with reference to the table below as the reasonably expected weather conditions for a given month. Contractor will still need to demonstrate the adverse effect on the construction schedule. Unless Orange Water and Sewer Authority agrees otherwise, the weather conditions must be shown by use of data, submitted by the Contractor, from either the National Weather Service (NWS) for Carrboro, North Carolina or NWS readings from a location closer to the site than Carrboro, North Carolina, and not by use of weather readings on the Site or by the Contractor. Notwithstanding the General Conditions, in order to request an extension of Contract Time for abnormal weather conditions the form must be submitted by the tenth (10th) day of the month after the month as to which the request is made.

Month	Expected number of days with 0.1 or more inches precipitation
January	10
February	10
March	10
April	9
May	10
June	9
July	11
August	10
September	8
October	7
November	8
December	9



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

4.06 Work Related to Weekends or Orange Water and Sewer Authority Holiday

- A. The Contractor shall have notified the Resident Project Representative by 3:30 PM, three (3) days in advance of the day of the Contractor's request to Work on a specific Saturday, Sunday, or holiday. Notwithstanding the General Conditions, if the day on which the notice is to be given is a Saturday, Sunday, or Orange Water and Sewer Authority holiday, Town of Chapel Hill Holiday, and Town restricted workdays the request shall be made by the first day before that Saturday, Sunday, or holiday that is not a Saturday, Sunday, or Orange Water and Sewer Authority holiday.

ARTICLE 5 - CONTRACT PRICE

5.01 Orange Water and Sewer Authority 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 other than Unit Price Work, a Lump Sum of: _____
_____ (words), (\$ _____ (numerals)).
- B. All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.
- C. For all Work, at the price(s) 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. Orange Water and Sewer Authority shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the twenty-fifth (25th) day of each month during performance of the Work as provided in Paragraphs 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 in the General Requirements:
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts Orange Water and Sewer



Authority may withhold, including but not limited to liquidated damages, in accordance with the Contract.

2. Orange Water and Sewer Authority will retain five (5%) percent of the amount of each estimate until Work covered by the Contract is fifty percent (50%) complete (50% of the Total Contract Amount). If after the Project is deemed fifty percent (50%) complete based upon the Contractor's gross Project invoices, excluding the value of materials stored on and off-site, and the Contractor provides Orange Water and Sewer Authority the following:
 - a. Written verification evidencing fifty percent (50%) completion of the Project; and,
 - b. Written consent of the surety named in the Project performance and payment bonds agreeing that Orange Water and Sewer Authority shall not retain more than two and one-half percent (2½%) of the Total Bid Price in retainage from periodic payments due to the Contractor;
 - c. Orange Water and Sewer Authority shall reduce retainage to two and one-half percent (2½%) of the Total Bid Price from future periodic payments if Orange Water and Sewer Authority finds that the Contractor is performing satisfactorily, and any nonconforming Work identified in writing by the Engineer or Orange Water and Sewer Authority (prior to the point of fifty percent (50%) Project completion) has been corrected by the Contractor and accepted by the Engineer or Orange Water and Sewer Authority, whoever provided such prior notice of nonconforming Work. If, however, Orange Water and Sewer Authority determines the Contractor's performance is unsatisfactory, Orange Water and Sewer Authority may reinstate the specified retainage for each subsequent periodic payment.
 - d. In addition to the retainage amounts allowed to be held by Orange Water and Sewer Authority, it shall also retain all rights allowed under this Agreement to withhold payment to the Contractor in accordance with the General Conditions and for unsatisfactory job progress, defective or nonconforming construction not remedied, disputed Work, or third-party claims filed against Orange Water and Sewer Authority or reasonable evidence that a third-party claim will be filed.
 - e. Within sixty (60) days of receipt by Orange Water and Sewer Authority of (1) an Application for Payment and (2) written consent of the surety, and after City has either (1) received a certificate of Substantial Completion or (2) received beneficial occupancy or use of the Project (if applicable), Orange Water and Sewer Authority shall pay an amount sufficient to increase total payment to Contractor to the Contract Price, less such amounts as Engineer shall determine in accordance with the General Conditions, including up to two hundred fifty percent (250%) of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Orange Water and Sewer Authority shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.
- B. Prior to issuing final payment, the Contractor will furnish to Orange Water and Sewer Authority certification that: All Subcontractors and vendors associated with this Contract have been paid; no liens and/or lawsuits have been placed against the Contractor for this Work; and the total dollar amount has been paid to all Subcontractors, Suppliers, and others associated with this project.
- C. Upon final completion and acceptance of the Work in accordance with the General Conditions, Orange Water and Sewer Authority shall pay the remainder of the Contract price as recommended by Engineer.

ARTICLE 7 – INTEREST [NOT IN CONTRACT]

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Orange Water and Sewer Authority to enter into this Agreement Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
- B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the General Conditions; and (2) reports and drawings relating to Hazardous Environmental Condition, if any, at or adjacent to the Site that have been identified in the General Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques,



sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in 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.
- G. Contractor is aware of the general nature of work to be performed by Orange Water and Sewer Authority and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. 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.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of all of the items listed in the Table of Contents.
- B. The documents listed in Paragraph 9.01 are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in Paragraph 9.01.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.
- E. Coordination of General Conditions, Agreement, and Technical Specifications.
 - 1. All components of the Contract Documents are essential elements of the Contract between the Owner and Contractor, and notwithstanding the requirements of Article 3.03 of the General Conditions, in case of a conflict or contradiction among the General Conditions, Agreement, and Technical Specifications, the following shall be the order of controlling authority as among these documents: The Technical Specifications shall control over the Agreement and the Agreement shall control over the General Conditions.



ARTICLE 10 - MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

10.05 Notices and Communications

- A. All notices and other communications required or permitted by Contract shall be in writing and shall be given by personal delivery, email, or certified United States mail (return receipt requested) addressed/email as follows:

To Orange Water and Sewer Authority:
Attention: Bill Rosa
Project Manager
Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, North Carolina 27510



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

To the Contractor:

Attention: _____

Firm Name: _____

Street Address: _____

City, State Zip Code: _____

Phone Number: _____

Email: _____

- B. A change of address, email, or person to receive notices or communications may be made by either party by notice given to the other party. Any notices or communications under Contract shall be deemed given at the time of actual delivery, if it is personally delivered or faxed. If the notices or communications are sent by United States mail, it shall be deemed given upon the third calendar day following the day on which the notices or communications were postmarked, or upon actual delivery, whichever first occurs.

10.06 Technical Data and Other Work

- A. Subsurface and Physical Conditions
No reports of explorations or tests of subsurface conditions at or contiguous to the Site are known to Orange Water and Sewer Authority or Engineer, that are not included with these documents as an Appendix.
- B. Hazardous Environmental Condition
No reports or drawings related to Hazardous Environmental Condition are known to Orange Water and Sewer Authority or Engineer.
- C. Other Work
Orange Water and Sewer Authority and Engineer are unaware of any other work on the Site at the time of Notice to Proceed.

10.07 Contractor's Liability Insurance

- A. Workers compensation insurance shall cover employers' liability, \$1,000,000.
- B. Automobile liability insurance shall have a combined single limit not less than \$2,000,000 per occurrence; aggregate limit not less than \$2,000,000 per year.
- C. The policies of insurance required by the General Conditions shall have a combined single limit not less than \$1,000,000 per occurrence; aggregate limit not less than \$2,000,000 per year.
- D. An Excess Liability Policy naming the contractor or other person who will be performing the activity as insured and also naming Orange Water and Sewer Authority and the Engineer as an additional insured in an amount not less than **\$10,000,000.00** for bodily injury, personal injury, property damage and products completed operations. (Coverage shall be at least as broad as provided for in the most current version of the Insurance Services Office Form applicable to such policy.)

Agreement Form – Lump Sum Single-Prime Contract

00 52 15-9

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02

PROJECT: Burning Tree Water Line Replacement

DATE: April 2026

- E. Professional liability insurance coverage self-insured retentions/deductibles in excess of \$10,000 must be approved by Orange Water and Sewer Authority's Finance Director.
- F. Professional liability insurance coverage shall have a combined single limit not less than \$2,000,000 per claim applicable to this Contract.

Wherever in this Article the terms "The Insured" and OWNER occurs with respect to coverage in a policy, it shall mean Orange Water and Sewer Authority and its agent and agencies, all municipalities where work is being performed under the Contract, the Engineer, and any other parties specifically designated herein, who shall be named as insured in each policy issued. The insurance policies required herein shall not contain any Third Party Beneficiary Exclusion.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CERTIFICATE OF INSURANCE (Attach)

See Article 5 of the General Conditions and Article 10.07 herein above for specific requirements.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

POWER OF ATTORNEY
(Attach)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 11 - CERTIFICATE OF ATTORNEY

I hereby certify that I am the duly appointed attorney for Orange Water and Sewer Authority and that I have examined the foregoing instrument and Bond, and insurance documents and I have approved the same as being legal and in proper form.

This _____ day of _____, 20____.

AUTHORITY GENERAL COUNSEL

ARTICLE 12 - CERTIFICATE OF PAYMENTS

I hereby certify that I am the legal and duly appointed Financial Officer for Orange Water and Sewer Authority and that provision for the payment of the moneys to fall due under this agreement has been made by appropriation duly made or by Bonds or notes duly authorized, as required by the Local Government and Fiscal Control Act.

This _____ day of _____, 20____.

BY:

DIRECTOR OF FINANCE AND
CUSTOMER SERVICE



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 13 - CONTRACTOR'S AFFIDAVIT

STATE OF _____

COUNTY OF _____

FOR CORPORATIONS:

THIS IS TO CERTIFY that on this day _____ appeared before me, with whom I am personally acquainted, who, being duly sworn, says that he or she* is the _____ (title of signatory party) and that _____ (name of attesting party) is the Assistant* Secretary of _____, the Corporation described in and which executed the foregoing Contract; that he or she* knows the common seal of said corporation; that the seal affixed to the said instrument is said common seal; that the name of the corporation was subscribed thereto by the said Vice* President and that the said Vice* President and Assistant* Secretary-subscribed their names thereto and said common seal was affixed, all by order of the Board of Directors of said Corporation, and said instrument is the act and Deed of said Corporation.

FOR PARTNERSHIPS AND INDIVIDUALS:

THIS IS TO CERTIFY that on this day _____ appeared before me, with whom I am personally acquainted, who, being duly sworn, says that he or she* is the Owner or Partner* of _____, the entity described in and which executed the foregoing Contract; and that if a Partner, he or she* attests that the consent of all partners was attained before executing said Contract.

Witness my hand and notarial seal, this the ____ day of _____, 20__

Notary Public

My commission expires: _____

* Strike as needed



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 14 - OWNER'S AFFIDAVIT

STATE OF _____

COUNTY OF _____

THIS IS TO CERTIFY that on this day (Todd Taylor* or Stephen Winters*)
_____ personally appeared, and acknowledged before me that
(he or she*) is the _____, of Orange Water and Sewer Authority, and
that, by authority of the Board of its Directors, (he or she*) executed the foregoing document on
its behalf, as its act and deed.

Witness my hand and notarial seal, this the ____ day of _____, 20__

* Strike as needed

Notary Public

My commission expires: _____



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

ARTICLE 15 - CONTRACT SIGNATURES

IN WITNESS WHEREOF, said Individual, Partnership or Corporation (circle one) has caused these presents to be signed in its corporate name, its corporate seal to be hereto affixed and attested by its secretary, and the Owner has caused these presents to be executed in its name by the Executive Director, attested by its Secretary and its Official Corporate Seal to be affixed all by order of its Board of Directors as of the day and year first above written.

Individuals or Partnerships Sign Below

Printed Legal Name of Individual or Partners:	Signature(s):
_____	_____ (SEAL)
_____	_____ (SEAL)
_____	_____ (SEAL)

ATTEST:

_____ Secretary	_____ Partnership Name (if applicable)

Corporations Sign Below

Name of Corporation: _____

ATTEST _____ Signature: _____

Corporate Secretary or Assistant Secretary

Title: _____

(SEAL) Officer's Printed Name: _____

OWASA Sign Below

ORANGE WATER AND SEWER AUTHORITY

By: _____

Todd Taylor, Executive Director (or Monica Dodson, Deputy Executive Director or Stephen Winters, Deputy Executive Director)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

IMPORTANT: If the Contractor is a Corporation, the legal name of the Corporation shall be set forth above, together with the signature of the officer or officers authorized to sign Contracts on behalf of the Corporation; if Contractor is a partnership, the true name of the firm shall be set forth above, together with the signatures of all the partners; and if Contractor is an individual, his signature shall be placed above. If signature is by an agent other than an officer of a Corporation or a member of a partnership, a Power of Attorney must be attached hereto. Signature of Owner and Contractor shall also be acknowledged before a Notary Public or other person authorized by law to execute such acknowledgment on the Owner's and Contractor's Affidavits which are found under Article 13 and Article 14 herein above this page.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

PERFORMANCE BOND AND PAYMENT BOND

Date of Contract: _____

Contract Name and Number: Burning Tree Water Line Replacement, CIP # 375-02

Name of Principal (Name of Contractor): _____

Name of Surety: _____

Name and Address of Surety's NC Resident Agent: _____

Contracting Body: Orange Water and Sewer Authority

Amount of Performance Bond (in words and numerals): _____
_____ dollars (\$_____)

Amount of Payment Bond: same dollar amount as the dollar amount of Performance Bond.

Date of Execution of these Bonds: _____

* * * * *

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, 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

Agreement Form – Lump Sum Single-Prime Contract

00 52 15-18

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

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 with respect to the Work, scope of work, and specifications.

* * * * *

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 NC General Statutes.



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

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.

ATTEST:

Principal Secretary
(SEAL)

Principal

By: _____(1)

By: _____(1)

By: _____(1)

(Address)

Witness as to Principal

(Phone Number)

(Surety)

ATTEST:

N. C. Resident Agent
(SEAL)

By: _____
Attorney-in-Fact

Witness as to Surety

(Address)

(Address)

(Phone Number)

(1) If Contractor is a Partnership, all partners should execute Bond

(Note: If you use a raised corporate seal, press hard enough to make it legible.)

Agreement Form – Lump Sum Single-Prime Contract

00 52 15-20

Burning Tree Water Line
Replacement



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

PERFORMANCE AND PAYMENT BOND - POWER OF ATTORNEY

(Attach)



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

**ACKNOWLEDGEMENT OF CONTRACTOR'S EXECUTION OF CONTRACT,
PERFORMANCE BOND AND PAYMENT BOND**

State of _____ County of _____

I, _____, a notary public for the aforesaid county and state, certify that personally appeared before me this day, and acknowledged that he or she is _____ Secretary of _____, a corporation, and that by authority duly given and as the act of the corporation, the foregoing (1) Contract with Orange Water and Sewer Authority and (2) Performance Bond and Payment Bond with respect to the Contract, were signed in its name by its _____ President, whose name is _____, sealed with its corporate seal, and attested by him/herself as its said Secretary or Assistant Secretary.

This the ____ day of _____ .

NOTARY PUBLIC

My commission expires: _____

**ACKNOWLEDGEMENT OF SURETY'S EXECUTION OF
PERFORMANCE BOND AND PAYMENT BOND**

State of _____ County of _____

I, _____, a Notary Public 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 Performance Bond and Payment Bond, in both of which bonds the contracting body is Orange Water and Sewer Authority, and that he or she executed said bonds, under the seal of said Surety, on behalf of said Surety.

This the ____ day of _____ .

NOTARY PUBLIC

My commission expires: _____



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

NON-DISCRIMINATION CLAUSE

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

This provision being incorporated for the benefit of the Orange Water and Sewer Authority and its residents may be enforced as set out in said ordinances; enforcement of this provision shall be by action for specific performance, injunctive relief, or other remedy as by law provided.

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

SIGNATURE FOR CORPORATION

Corporate Name

ATTEST:

_____ Secretary* / Assistant Secretary*	BY: _____ President* / Vice President*
_____ (Printed Name)	_____ (Printed Name)

(Corporate Seal)

INDIVIDUAL OR PARTNERSHIP SIGNATURE

BY: _____(SEAL)
(Printed Name)

WITNESS:

(Printed Name)

*choose one

-END OF DOCUMENT-



DOCUMENT 00 52 16

FORM OF SUBMITTALS

The forms listed below and included in this Section are to be used in accordance with the requirements noted in other Sections and included herein. The first five digits of the form number generally refers to the Section number which would provide the most information or instruction regarding that form. Forms such as the Bid Form are included in the Section to which it pertains.

Any form referred to in the Contract Documents but not contained in the Project Manual should be requested from Orange Water and Sewer Authority and the failure to include a required form herein does not excuse the Contractor from the requirement to use that form.

Form #	Title
00300-A	Notice of Award
00500-A	Notice to Proceed
00700-A	Certificate of Substantial Completion
00700-B	MBE Documentation for Contract Payments
00700-F	Application and Certification for Progress Payment
00700-G	Work Change Directive
00700-H	Field Order
00700-I	Change Order
00700-C	AIA Document G706 Contractor's Affidavit of Payments of Debts & Claims
00700-D	AIA Document G706A Contractor's Affidavit or Release of Liens
00700-E	AIA Document G707 Consent of Surety Company to Final Payment
	NC Sales & Use Tax Affidavit



CIP NO.: **375-02**
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

NOTICE OF AWARD

CIP # 375-02

To: _____

From: Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

Project: Burning Tree Water Line Replacement

Contract Amount: \$ _____

You are hereby notified that Orange Water and Sewer Authority has accepted your Bid dated _____ for the above named project in response to its Advertisement for Bids.

You are required by the Instructions to Bidders to execute the formal Contract with Orange Water and Sewer Authority and to furnish Performance and Payment Bonds and evidence of insurance (per Article 6 of the General Conditions and Agreement Section 10.07) within 10 calendar days from the date of delivery of this Notice.

If you fail to execute said Contract and to furnish said bonds and insurance within 10 calendar days from the date of delivery of this Notice, Orange Water and Sewer Authority shall be entitled to consider all of your rights arising out of its acceptance of your Bid as abandoned and to award the Work covered by the Advertisement to Bids to another, to re-advertise the Work, or otherwise dispose thereof as Orange Water and Sewer Authority sees fit.

Dated this ____ day of _____, ____

By: _____

By: _____

Date: _____

Date: _____

Title: Finance Officer

Title: Director of Engineering & Planning

This Instrument has been pre-audited in the
manner required by the Local Government
Budget and Fiscal Control Act

Orange Water and Sewer Authority

ACCEPTANCE OF NOTICE BY CONTRACTOR

Receipt of this Notice of Award is hereby acknowledged.

By: _____

Date: _____

Title: _____



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

NOTICE TO PROCEED

PO # _____
CIP # _____

To: _____

From: Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

Project: Burning Tree Water Line Replacement

Contract Amount: _____

You are hereby notified that the Contract Time(s) for the above Project will commence to run on _____. You are directed to commence work on the referenced Project by that date. You are to complete the Work on or before the completion dates noted below.

The Contract Time(s) based on the durations set forth in Article 4 of the Agreement are:

Substantial Completion of All Work:	<u>365 Calendar Days</u>
Final Completion of All Work:	<u>395 Calendar Days</u>

Article 4 of the Agreement provides for the assessment of Liquidated Damages for each consecutive calendar day the Work remains incomplete after the above completion dates.

By: _____
Title: Director of Engineering and Planning
Date: _____

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CERTIFICATE OF SUBSTANTIAL COMPLETION

CIP # _____

To: _____

From: Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

Project: **Burning Tree Water Line Replacement**_____

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer and the Work is hereby declared to be substantially complete in accordance with the Contract Documents on _____.

A tentative list of items to be completed or corrected will be issued as the punch list. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of Contractor to complete all the Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities and warranties shall be as follows:

Owner _____

Contractor _____

This certificate does not constitute an acceptance of Work that is not in accordance with the Contract Documents nor is it release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

RECOMMENDATION OF ENGINEER

By: _____ Title: _____
Firm: _____ Date: _____

ACCEPTANCE BY CONTRACTOR

By: _____ Title: _____
Firm: _____ Date: _____

APPROVAL BY OWNER

By: _____ Title: _____
Firm: Orange Water and Sewer Authority Date: _____



CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor: _____

Address & Phone: _____

Project Name: _____

Pay Application #: _____ Period: _____

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT PAID THIS MONTH	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: _____ Approved/Certified By: _____
Name

Title

Signature

SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

APPLICATION AND CERTIFICATION FOR PROGRESS PAYMENT

CIP # 375-02

To: Orange Water & Sewer Authority (Owner) Application #: _____

Project: Burning Tree Water Line Replacement

Period Covered: From: _____ To: _____

Application for Payment:

This Application for Progress Payment is submitted in accordance with the General Conditions of the Contract Documents. Application is hereby made for the progress payment in the amount indicated below:

A.	<u>Original Contract Price (Schedule of Values)</u>	\$ 0.00
B.	Net Total Value of Executed Change Orders to Date	0.00
C.	<u>CONTRACT VALUE TO DATE (A+B)</u>	0.00
D.	Value of Completed Change Order Work	0.00
E.	Value of Completed Original Contract Work and Stored Materials to Date	0.00
F.	<u>TOTAL VALUE OF COMPLETED WORK AND STORED MATERIALS TO DATE (D+E)</u>	0.00
G.	Retainage Amount (5% x F)	0.00
H.	Retainage Held this Request	0.00
I.	Other Withholding (if any)	0.00
J.	Total Value of Previous Progress Payments	0.00
K.	<u>TOTAL VALUE OF DEDUCTIONS (G+I+J)</u>	0.00
L.	<u>AMOUNT DUE THIS APPLICATION (F-K)</u>	\$ 0.00

CONTRACTOR CERTIFICATION:

The undersigned Contractor certifies that (1) all previous payments received from Owner on account of Work done under the Contract referred to above have been applied to discharge, in full, obligations of Contractor incurred in connection with Work covered by prior Applications for Payment numbered 1 through ____ inclusive and (2) title to all materials and equipment incorporated in said Work or otherwise listed in, or covered by, this Application for Progress Payment will pass to Owner at time of payment free and clear of all liens, claims, security interests and encumbrances (except such as covered by Bond acceptable to Owner).

Firm: _____

By: _____

Title: _____

Date: _____

ENGINEER CERTIFICATION:

Payment of the above AMOUNT DUE THIS APPLICATION is hereby recommended.

Firm: _____

By: _____

Title: _____

Date: _____

OWASA APPROVAL:

Payment of the above AMOUNT DUE THIS APPLICATION is hereby approved.

OWASA Account #: 6000

By: _____

PO #: _____

Date: _____



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

WORK CHANGE DIRECTIVE

PO # _____

WCD # _____

Project: Burning Tree Water Line Replacement Date: _____

Owner: Orange Water and Sewer Authority Engineer: _____

Contractor: _____

Title: _____

You are directed to proceed promptly with the following change(s):

If a claim is made that the above change(s) have affected Contract Price or Contract Time, any claim for a Change Order based thereon will involve one of the following methods of determining the effect of the change(s).

Method of determining change in Contract Price:

_____ Time and materials
_____ Unit Prices
_____ Cost plus fixed fee
_____ Other: _____

Method of determining change in Contract Time:

_____ Contractor's records
_____ Inspector's records
_____ Other: _____

Estimated change in Contract Price:

\$ _____. This estimated change in Contract Price is not to be exceeded without further authorization.

Estimated change in Contract Time:

_____ days. This estimated change in Contract Time is not to be exceeded without further authorization.

RECOMMENDATION OF WORK CHANGE DIRECTIVE

By: _____
Firm: _____
Date: _____

By: _____
Firm: _____
Date: _____

OWASA APPROVAL OF WORK CHANGE DIRECTIVE

By: _____

Date: _____



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

FIELD ORDER

PO # _____

FO # _____

Project: Burning Tree Water Line Replacement Date: _____

Owner: Orange Water and Sewer Authority **Engineer:** _____

Contractor: _____

This Field Order is issued to interpret/clarify the Contractor Documents, order minor changes in the Work, and/or to documents trade-off agreements. Owner and Contractor hereby agree that the work described in this Field Order is to be accomplished without changes in Contract Price, Contract Time, claim or other costs. Contractor is to execute this Field Order and return it to Owner for execution within 48 hours.

Title: _____

Description:

Attachments:

Owner: _____

Contractor: _____

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____



Orange Water & Sewer Authority

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

CHANGE ORDER

PO # _____

CO # _____

To: _____

From: Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

PROJECT: Burning Tree Water Line Replacement

You are hereby notified that OWASA is issuing **Change Order #** _____ for the above referenced contract under the provisions of Article 10 of the General Conditions. This change is subject to all the terms, conditions and provisions of the original contract.

Item #	Description Of Changes (Increases)	Amount
a.	Insert descriptions here	\$0,000.00
b.	Insert descriptions here	\$0,000.00
c.	Insert descriptions here	\$0,000.00
Subtotal of these changes		\$000,000.00
Contract Amount before modified		\$000,000.00
Contract Amount as modified		\$000,000.00

Description of Change: Description of each increase and associated cost breakdowns are attached, along with all related project communications.

Contract performance period changes: _____ (Unchanged / Increased / Decreased)

RECOMMENDATION OF CHANGE ORDER (BY CONSULTANT)

The change described above is hereby recommended:

By: _____ Title: _____
Firm: _____ Date: _____

ACCEPTANCE OF CHANGE ORDER (BY CONTRACTOR)

The change described above is accepted and hereby acknowledged:

By: _____ Title: _____
Firm: _____ Date: _____

APPROVAL OF CHANGE ORDER (BY OWNER)

By: _____ By: _____ By: _____
Date: _____ Date: _____ Date: _____

Title: Finance Officer Title: Executive Director Title: Director of Engineering & Planning
Orange Water and Sewer Authority Orange Water and Sewer Authority

This Instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act



Orange Water & Sewer Authority



AIA[®] Document G706A[™] – 1994

Contractor's Affidavit of Release of Liens

OWNER	☐
ARCHITECT	☐
CONTRACTOR	☐
SURETY	☐
OTHER	☐

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

TO OWNER: *(Name and address)*

CONTRACT DATED:

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

Instructions for AIA Document G706A™

Contractor's Affidavit of Release of Liens - 1994 Edition

A. General Information

1. Purpose

This document is intended for use as companion to AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims.

2. Related Documents

This document may be used with most of AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, this is a companion document to AIA Document G706.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Reproductions

This document is a copyrighted work and may not be reproduced or excerpted from without the express written permission of the AIA. There is no implied permission to reproduce this document, nor does membership in The American Institute of Architects confer any further rights to reproduce this document.

The AIA hereby grants the purchaser a limited license to reproduce a maximum of ten copies of a completed G706A, but only for use in connection with a particular project. The AIA will not permit reproduction outside of the limited license for reproduction granted above, except upon written request and receipt of written permission from the AIA.

Rights to reproduce the document may vary for users of AIA software. Licensed AIA software users should consult the End User License Agreement (EULA).

To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.

B. Changes From the Previous Edition

A cross reference to AIA Document A201 has been deleted to permit the use of G706A with other families of AIA documents, including construction management, interiors and design/build.

C. Completing the G706A Form

GENERAL: The Owner-Contractor Agreement is the usual source of required information such as the contract date and the names and addresses of the Owner, Project and Contractor.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

AFFIDAVIT: Indicate the state and county where the Affidavit is made. This is not necessarily the same location as the Project, but should be the location where the notary is authorized to administer sworn oaths. If there are any EXCEPTIONS to the statement, these should be listed in the space provided; otherwise enter as "None". It may be a stipulation of the Contract Documents that the Owner has the right to require the Contractor to furnish a bond to cover each exception listed on the Affidavit.

SUPPORTING DOCUMENTS: The AIA does not publish a "Release or Waiver of Liens" for contractors or subcontractors because of the great diversity of releases or waivers permitted by various state mechanics lien laws. Forms for such purposes may be available from local contractors' associations or may be written with the assistance of legal counsel.

D. Execution of the Document

The Notary Public should administer a sworn oath to the Contractor in reference to the written statements appearing on G706A, and should duly sign and seal this document containing the Contractor's signature. G706A should be signed by the Contractor or the Contractor's authorized representative.

AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

OWNER	☐
ARCHITECT	☐
CONTRACTOR	☐
SURETY	☐
OTHER	☐

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

TO OWNER: *(Name and address)*

CONTRACT DATED: _____

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☐ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

Instructions for AIA Document G706™

Contractor's Affidavit of Payment of Debts and Claims - 1994 Edition

A. General Information

1. Purpose

This document is intended for use when the Contractor is required to provide a sworn statement verifying that debts and claims have been settled, except for those listed by the Contractor under "EXCEPTIONS" in the document. G706 is typically executed as a condition of final payment.

2. Related Documents

This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. G706 also requires the attachment of several supporting documents, including G706A, Contractor's Affidavit of Release of Liens, and G707, Consent of Surety to Reduction in or Release of Retainage.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Reproductions

This document is a copyrighted work and may not be reproduced or excerpted from without the express written permission of the AIA. There is no implied permission to reproduce this document, nor does membership in The American Institute of Architects confer any further rights to reproduce this document.

The AIA hereby grants the purchaser a limited license to reproduce a maximum of ten copies of a completed G706, but only for use in connection with a particular project. The AIA will not permit reproduction outside of the limited license for reproduction granted above, except upon written request and receipt of written permission from the AIA.

Rights to reproduce the document may vary for users of AIA software. Licensed AIA software users should consult the End User License Agreement (EULA).

To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.

B. Changes from the Previous Edition

A cross-reference to AIA Document A201 has been deleted to permit the use of G706 with other families of AIA documents, including construction management, interiors and design/build.

C. Completing the G706 Form

GENERAL: The Owner-Contractor Agreement is the usual source of required information such as the contract date and the names and addresses of the Owner, Project and Contractor.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as General Construction or Mechanical Work.

AFFIDAVIT: Indicate the state and county where the Affidavit is made. This is not necessarily the same location as the Project, but should be the location where the notary is authorized to administer sworn oaths. If there are any **EXCEPTIONS** to the statement, these should be listed in the space provided; otherwise enter as "None". It may be a stipulation of the Contract Documents that the Owner has the right to require the Contractor to furnish a bond to cover each exception listed on the Affidavit.

SUPPORTING DOCUMENTS: The AIA documents listed as attachments to the G706 form should be of the same (current) edition date as G706. The AIA does not publish a "Release or Waiver of Liens" for contractors or subcontractors because of the great diversity of releases or waivers permitted by various state mechanics lien laws. Forms for such purposes may be available from local contractors' associations or may be written with the assistance of legal counsel.

D. Execution of the Document

The Notary Public should administer a sworn oath to the Contractor referencing the written statements appearing on G706, and should duly sign and seal this document containing the Contractor's signature. G706 should be signed by the Contractor or the Contractor's authorized representative.

AIA[®] Document G707[™] – 1994

Consent Of Surety to Final Payment

OWNER	☐
ARCHITECT	☐
CONTRACTOR	☐
SURETY	☐
OTHER	☐

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

TO OWNER: *(Name and address)*

CONTRACT DATED:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of
(Insert name and address of Contractor)

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of
any of its obligations to
(Insert name and address of Owner)

, CONTRACTOR,

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

(Surety)

(Signature of authorized representative)

Attest:
(Seal):

(Printed name and title)

Instructions for AIA Document G707™

Consent of Surety to Final Payment - 1994 Edition

A. General Information

1. Purpose

This document is intended for use as a companion to AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims, on construction projects where the Contractor is required to furnish a bond. By obtaining the Surety's approval of final payment to the Contractor and its agreement that final payment will not relieve the Surety of any of its obligations, the Owner may preserve its rights under the bond.

2. Related Documents

This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, this is a companion document to AIA Document G706.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Reproductions

This document is a copyrighted work and may not be reproduced or excerpted from without the express written permission of the AIA. There is no implied permission to reproduce this document, nor does membership in The American Institute of Architects confer any further rights to reproduce this document.

The AIA hereby grants the purchaser a limited license to reproduce a maximum of ten copies of a completed G707, but only for use in connection with a particular project. The AIA will not permit reproduction outside of the limited license for reproduction granted above, except upon written request and receipt of written permission from the AIA.

Rights to reproduce the document may vary for users of AIA software. Licensed AIA software users should consult the End User License Agreement (EULA).

To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.

B. Changes from the Previous Edition

Changes in the location of various items of information were made, without revision to the substance of the document.

C. Completing the G707 Form

GENERAL: The bond form is the usual source of required information such as the contract date and the names and addresses of the Surety, Owner, Contractor and Project.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

D. Execution of the Document

The G707 form requires both the Surety's seal and the signature of the Surety's authorized representative.

(Paid During The Current Period Ending)

COUNTY: _____
ESTIMATE NO: _____

I certify that the above listed vendors were paid sales tax upon purchase of building materials during the period covered by the construction estimate and the property upon which such taxes were paid with or will be used in the performance of this contract. No tax on purchases or rentals of tools and/or equipment is included in the above list. All of the material above became a part of or is annexed to the building(s) or structure(s) being erected, altered or repaired.

Contractor's Signature

My Commision Expires: _____

RULES IMPLEMENTING MEDIATED
SETTLEMENT CONFERENCES IN
NORTH CAROLINA PUBLIC CONSTRUCTION PROJECTS

Adopted
February 26, 2002

Table of Rules

Rule

1. Initiating Mediated Settlement Conferences
 - A. Purpose of Mandatory Settlement Conferences.
 - B. Initiating the Dispute Resolution Process.
2. Selection of Mediator
 - A. Selection of Certified Mediator by Agreement of the Parties.
 - B. Nomination and Court Approval of a Non-Certified Mediator.
 - C. Appointment of Mediator by the SCO.
 - D. Mediator Information Directory.
 - E. Disqualification of Mediator.
3. The Mediated Settlement Conference
 - A. Where Conference is to be Held.
 - B. When Conference is to be Held.
 - C. Request to Extend Deadline for Completion.
 - D. Recesses.
 - E. The Mediated Settlement Conference shall not be cause for the Delay of the Construction Project which is the focus of the Dispute.
4. Duties of Parties and Other Participants in Formal Dispute Resolution Process
 - A. Attendance.
 - B. Finalizing Agreement.
 - C. The Mediation Fee shall be paid in accordance with G.S. 143-128(g).
 - D. Failure to Compensate Mediator.
5. Authority and Duties of Mediators
 - A. Authority of Mediator.
 - B. Duties of Mediator.
6. Compensation of the Mediator
 - A. By Agreement.
 - B. By Appointment.
7. Mediator Certification
8. Rule Making
9. Definitions
10. Time Limits

RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

A. Purpose of Mandatory Settlement Conferences. Pursuant to G.S. 143-128(g) 143-135.26(11), these Rules are promulgated to implement a system of settlement events which are designated to focus the parties' attention on settlement rather than on claim preparation and to provide a structured opportunity for settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.

B. Initiating the Dispute Resolution Process

- 1) Any party to a public construction contract governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. 143-128(g) and who is a party to a dispute arising out of the construction process in which the amount in controversy is at least \$15,000 may submit a written request to the public owner for mediation of the dispute.
- 2) Prior to submission of a written request for mediation to the public owner, the parties requesting mediation,
 - a) If a prime contractor, must have first submitted its claim to the Project Designer for review as set forth in Exhibit A. If the dispute is not resolved through the Project Designer's instructions, then the dispute becomes ripe for mediation in the Formal Dispute Resolution Process, and the party may submit his written request for mediation to the public owner.
 - b) If the party requesting mediation is a subcontractor, it must first have submitted its claim for mediation to the prime contractor with whom it has a contract. If the dispute is not resolved through the Prime Contractor's involvement, then the dispute becomes ripe for mediation in the Formal Dispute Resolution Process, and the party may submit its written request for mediation to the public owner.
 - c) If the party requesting mediation is the Project Designer, then it must first submit its claim to the public owner to resolve. If the dispute is not resolved with the public owner's involvement, then the Project Designers' dispute is ripe for mediation in the Formal Dispute Resolution Process, and the Project Designer may submit its written request to the public owner for mediation.

RULE 2. SELECTION OF MEDIATOR

A. Selection of Certified Mediator by Agreement of the Parties. The parties may select a mediator certified pursuant to the Rules by agreement within 21 days of requesting mediation. The requesting party shall file with the State Construction Office (hereinafter collectively referred to as the "SCO") or public owner if a non-State project a Notice of Selection of Mediator by Agreement within 10 days of the request; however, any party may file the notice. Such notice shall state the name, address and telephone number of the mediator selected; state the rate of compensation of the mediator; state that the mediator and opposing counsel have agreed upon the selection and rate of compensation; and state that the mediator is certified pursuant to these Rules.

- B. Nomination and Public Owner Approval of a Non-Certified Mediator.** The parties may select a mediator who does not meet the certification requirements of these rules but who, in the opinion of the parties and the SCO or public owner, is otherwise qualified by training or experience to mediate the action.

If the parties select a non-certified mediator, the requesting party shall file with the SCO a Nomination of Non-Certified Mediator within 10 days of the request. Such nomination shall state the name, address and telephone number of the mediator; state the training, experience or other qualifications of the mediator; state the rate of compensation of the mediator; and state that the mediator and opposing counsel have agreed upon the selection and rate of compensation.

The SCO or public owner shall rule on said nomination, shall approve or disapprove of the parties' nomination and shall notify the parties of its decision.

- C. Appointment of Mediator by the SCO.** If the parties cannot agree upon the selection of a mediator, the party or party's attorney shall so notify the SCO or public owner and request, on behalf of the parties, that the SCO or public owner appoint a mediator. The request for appointment must be filed within 10 days after request to mediate and shall state that the parties have had a full and frank discussion concerning the selection of a mediator and have been unable to agree. The request shall state whether any party prefers a certified attorney mediator, and if so, the SCO or public owner shall appoint a certified attorney mediator. If no preference is expressed, the SCO or public owner may appoint a certified attorney mediator or a certified non-attorney mediator.
- D. Mediator Information Directory.** To assist the parties in the selection of a mediator by agreement, the parties are free to utilize the list of certified mediators maintained in any county participating in the Superior Court Mediation Settlement Conference Program.
- E. Disqualification of Mediator.** Any party may request replacement of the mediator by the SCO or public owner for good cause. Nothing in this provision shall preclude mediators from disqualifying themselves.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

- A. Where Conference is to be Held.** Unless all parties and the mediator otherwise agree, the mediated settlement conference shall be held in the county where the project is located. The mediator shall be responsible for reserving a place and making arrangements for the conference and for giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons and entities required to attend.
- B. When Conference is to be Held.** The deadline for completion of the mediation shall be not less than 30 days nor more than 60 days after the naming of the mediator.
- C. Request to Extend Deadline for Completion.** A party, or the mediator, may request the SCO or public owner to extend the deadline for completion of the conference. Such request shall state the reasons the extension is sought and

shall be served by the moving party upon the other parties and the mediator. If any party does not consent to the request, said party shall promptly communicate its objection to the SCO or public owner.

The SCO or public owner may grant the request by setting a new deadline for completion of the conference.

- D. **Recesses.** The mediator may recess the conference at any time and may set times for reconvening. If the time for reconvening is set before the conference is recessed, no further notification is required for persons present at the conference.

- E. **The mediated settlement conference shall not be cause for the delay of the construction project which is the focus of the dispute.**

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS

A. **Attendance.**

- 1) All parties to the dispute originally presented to the Designer or Prime Contractor for initial resolution must attend the mediation. Failure of a party to a construction contract to attend the mediation will result in the public owner's withholding of monthly payment to that party until such party attends the mediation.
- 2) Attendance shall constitute physical attendance, not by telephone or other electronic means. Any attendee on behalf of a party must have authority from that party to bind it to any agreement reached as a result of the mediation.
- 3) Attorneys on behalf of parties may attend the mediation but are not required to do so.
- 4) Sureties or insurance company representatives are not required to attend the mediation unless any monies paid or to be paid as a result of any agreement reached as a result of mediation require their presence or acquiescence. If such agreement or presence is required, then authorized representatives of the surety or insurance company must attend the mediation.

- B. **Finalizing Agreement.** If an agreement is reached in the conference, parties to the agreement shall reduce its terms to writing and sign it along with their counsel.

- C. **The mediation fee shall be paid in accordance with G.S. 143-128(g).**

- D. **Failure to compensate mediator.** Any party's failure to compensate the mediators in accordance with G.S. 143-128(g) shall subject that party to a withholding of said amount of money from the party's monthly payment by the public owner.

Should the public owner fail to compensate the mediator, it shall hereby be subject to a civil cause of action from the mediator for the 1/3 portion of the mediator's total fee as required by G.S. 143-128(g).

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

A. Authority of Mediator.

- 1) *Control of Conference.* The mediator shall at all times be in control of the conference and the procedures to be followed.
- 2) *Private Consultation.* The mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.
- 3) *Scheduling the Conference.* The mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants, attorneys and mediator. In the absence of agreement, the mediator shall select the date for the conference.

B. Duties of Mediator.

- 1) The mediator shall define and describe the following at the beginning of the conference:
 - a) The process of mediation;
 - b) The difference between mediation and other forms of conflict resolution;
 - c) The costs of the mediated settlement conference;
 - d) That the mediated settlement conference is not a trial, the mediator is not a judge, and the parties retain their legal rights if they do not reach settlement;
 - e) The circumstances under which the mediator may meet and communicate privately with any of the parties or with any other person;
 - f) Whether and under what conditions communications with the mediator will be held in confidence during the conference;
 - g) The inadmissibility of conduct and statements as provided by G.S. 7A-38.1(1);
 - h) The duties and responsibilities of the mediator and the participants; and
 - i) That any agreement reached will be reached by mutual consent.
- 2) *Disclosure.* The mediator has a duty to be impartial and to advise all participants of any circumstance bearing on possible bias, prejudice or partiality.
- 3) *Declaring Impasse.* It is the duty of the mediator timely to determine that an impasse exists and that the conference should end.
- 4) *Reporting Results of Conference.* The mediator shall report to the SCO or public owner within 10 days of the conference whether or not an agreement was reached by the parties. If an agreement was reached, the report shall state the nature of said agreement. The mediator's report shall inform the SCO or public owner of the absence of any party known to the mediator to have been absent from the mediated settlement conference without permission. The SCO or public owner may require the mediator to provide statistical data for evaluation of the mediated settlement conference program.
- 5) *Scheduling and Holding the Conference.* It is the duty of the mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. Deadlines for completion of the conference shall be strictly observed by the mediator unless said time limit is changed by a written order of the SCO or public owner.

RULE 6. COMPENSATION OF THE MEDIATOR

- A. **By Agreement.** When the mediator is stipulated by the parties, compensation shall be as agreed upon between the parties and the mediator provided that the provision of G.S. 143-128(g) are observed.
- B. **By Appointment.** When the mediator is appointed by the SCO or public owner, the parties shall compensate the mediator for mediation services at the rate in accordance with the rate charged for Superior Court mediation. The parties shall also pay to the mediator a one-time per case administrative rate in accordance with the rate charged for Superior Court mediation, which is due upon appointment.

RULE 7. MEDIATOR CERTIFICATION.

All mediators certified in the Formal Dispute Resolution Program shall be properly certified in accordance with the rules certifying mediators in Superior Court in North Carolina. * When selecting mediators, the parties may designate a preference for mediators with a background in construction law or public construction contracting. Such requirements, while preferred, are not mandatory under these rules.

All mediators chosen must either demonstrate they are certified in accordance with the Rules Implementing Scheduled Mediated Settlement Conference in Superior Court or must gain the consent of the SCO or public owner to mediate any dispute in accordance with these rules.

* Except when otherwise allowed by the SCO or public owner upon the request of the parties to the mediation.

RULE 8. RULE MAKING

These Rules are subject to amendment by rule making by the State Building Commission.

These Rules are mandated for State projects when the contracting state entity has not otherwise adopted its own dispute resolution provision. These rules are optional for all other projects subject to Article 8, Ch. 143 of the General Statutes.

RULE 9. DEFINITIONS

When the phrase "SCO or public owner" is used in these rules, "SCO" shall apply to state projects, "public owner" shall apply to non-state public projects.

RULE 10. TIME LIMITS

On state contracts, any time limit provided for by these Rules may be waived or extended by the SCO for good cause shown.

On non-state contracts, any time limit provided for by these Rules may be waived or extended by the mediator it appoints for good cause shown. If the mediator has not yet been appointed, the designer of record shall decide all waivers or extensions of time for good cause shown.

Exhibit A

DISPUTE RESOLUTION

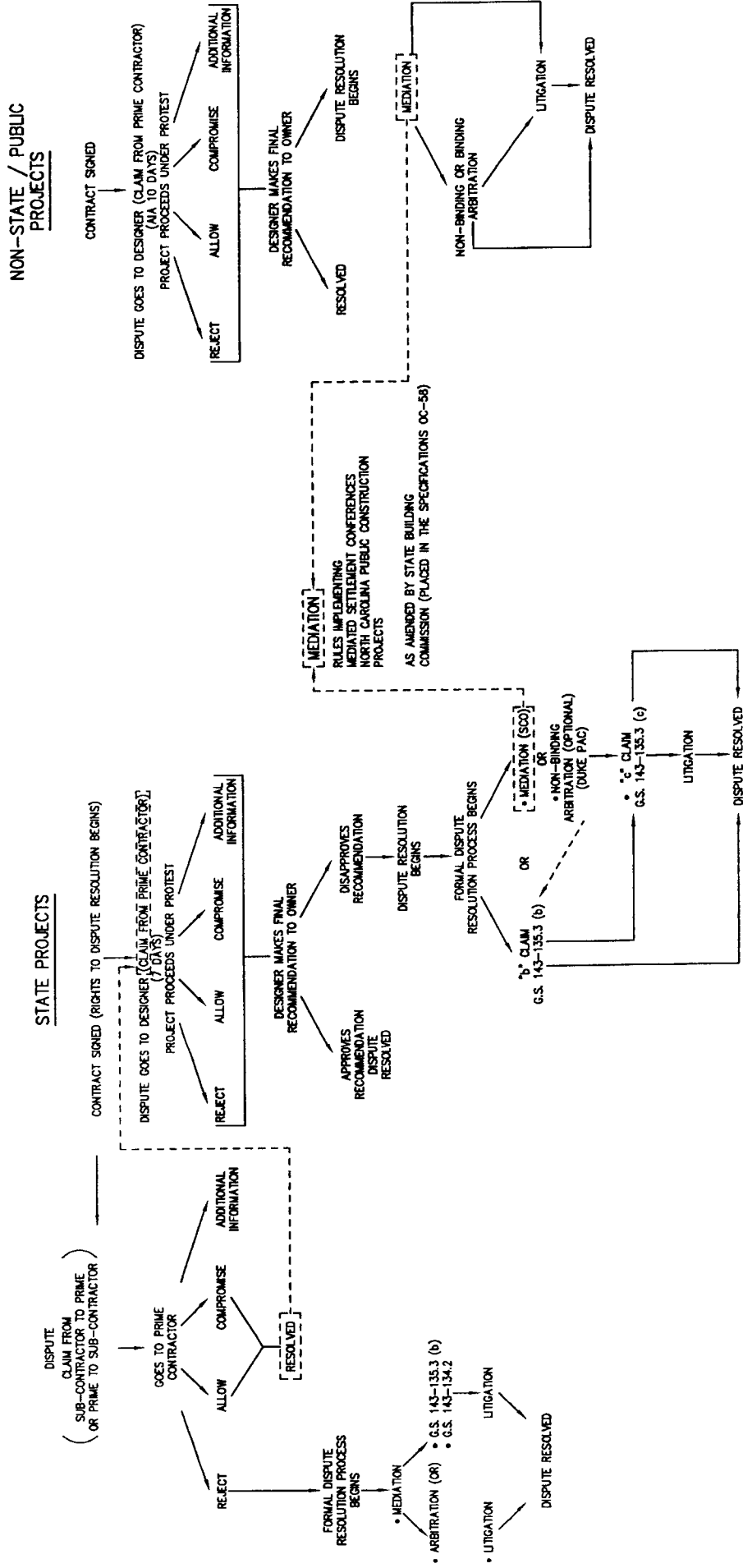


Exhibit A

DISPUTE RESOLUTION

STATE PROJECTS

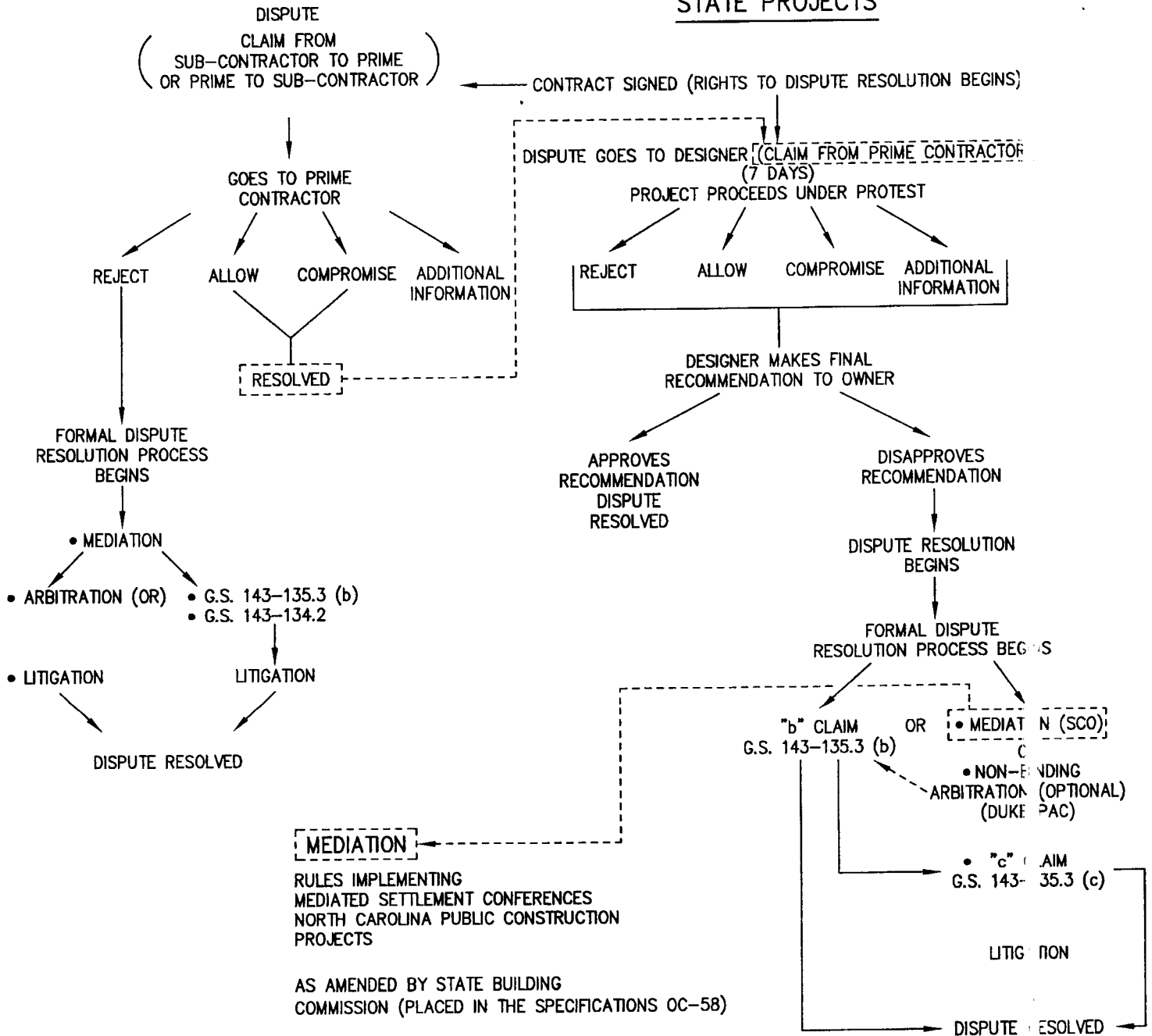
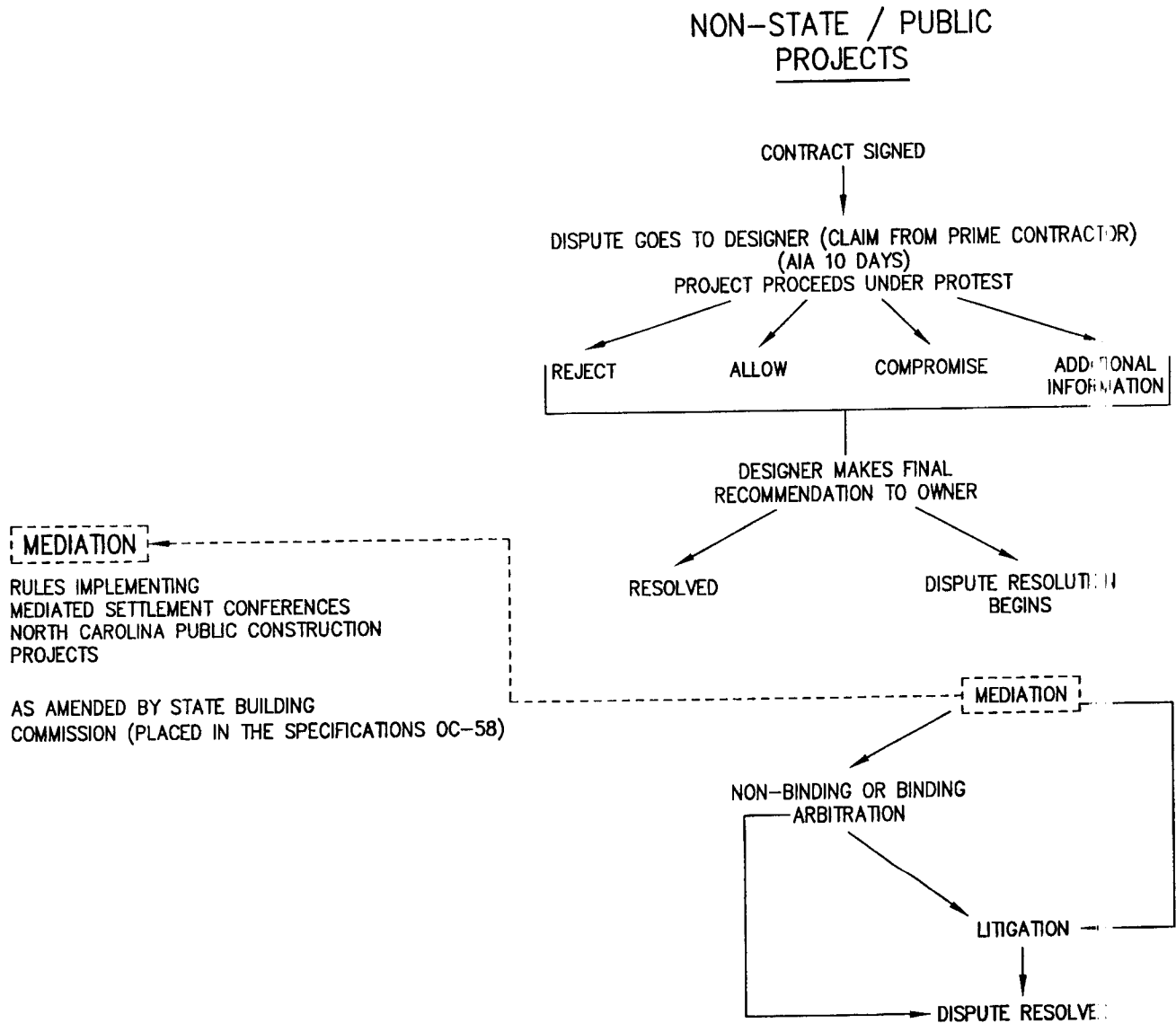


Exhibit A

DISPUTE RESOLUTION



STATE OF _____
COUNTY OF _____

AFFIDAVIT OF _____[name of person signing]

REGARDING COMPLIANCE WITH NCGS CHAPTER 64, ARTICLE 2
[a copy of which, current as of September 6, 2013, is attached for reference]

I, _____, being first duly sworn, hereby depose and say:

1. I am over eighteen years of age and competent to make this Affidavit. All statements made herein are based upon my personal knowledge.

2. _____ (“Employer”) desires to enter into a contract with the Orange Water and Sewer Authority [more specifically known as “Contract for Documents for the West Rosemary Street Water Line Replacement, Orange and Water Sewer Authority, CIP No. 276-95”] (“Agreement”).

3. I am the _____ [title] for the Employer and I am duly authorized to represent and bind the Employer and execute this Affidavit.

4. I hereby swear that Employer is a person, business entity, or other organization that transacts business in North Carolina and that currently employs [choose one]:

_____25 or more employees in North Carolina

OR

_____less than 25 employees in North Carolina

5. I hereby swear that Employer now complies, and for the duration of Agreement will comply, with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes, “Verification of Work Authorization.”

6. I hereby swear that any subcontractors hired by Employer in relation to Agreement now comply, and for the duration of Agreement will comply, with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes, “Verification of Work Authorization.”

Further the Affiant sayeth not.

This the ____ day of _____, 20__.

Name:

Title:

Sworn and subscribed before me this the ____ day of _____, 20__.

Notary Public

My commission expires: _____

[Notarial Seal]

Article 2.

Verification of Work Authorization.

§ 64-25. Definitions.

The following definitions apply in this Article:

- (1) Commissioner. – The North Carolina Commissioner of Labor.
- (2) Employ. – Hire an employee.
- (3) Employee. – Any individual who provides services or labor for an employer in this State for wages or other remuneration. The term does not include an individual whose term of employment is less than nine months in a calendar year.
- (4) Employer. – Any person, business entity, or other organization that transacts business in this State and that employs 25 or more employees in this State. This term does not include State agencies, counties, municipalities, or other governmental bodies.
- (5) E-Verify. – The federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law.
- (6) Unauthorized alien. – As defined in 8 U.S.C. § 1324a(h)(3).

§ 64-26. Verification of employee work authorization.

(a) Employers Must Use E-Verify. – Each employer, after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify.

(b) Employer Preservation of E-Verify Forms. – Each employer shall retain the record of the verification of work authorization required by this section while the employee is employed and for one year thereafter.

§ 64-27. Commissioner of Labor to prepare complaint form.

(a) Preparation of Form. – The Commissioner shall prescribe a complaint form for a person to allege a violation of G.S. 64-26. The form shall clearly state that completed forms may be sent to the Commissioner.

(b) Certain Information Not Required. – The complainant shall not be required to list the complainant's social security number on the complaint form or to have the complaint notarized.

§ 64-28. Reporting of complaints.

(a) Filing of Complaint. – Any person with a good faith belief that an employer is violating or has violated G.S. 64-26 may file a complaint with the Commissioner setting forth the basis for that belief. The complaint may be on a form prescribed by the Commissioner pursuant to G.S. 64-27 or may be made in any other form that gives the Commissioner information that is sufficient to proceed with an investigation pursuant to G.S. 64-29. Nothing in this section shall be construed to prohibit the filing of anonymous complaints that are not submitted on a prescribed complaint form.

(b) False Statements a Misdemeanor. – A person who knowingly files a false and frivolous complaint under this section is guilty of a Class 2 misdemeanor.

§ 64-29. Investigation of complaints.

(a) Investigation. – Upon receipt of a complaint pursuant to G.S. 64-28 that an employer is allegedly violating or has allegedly violated G.S. 64-26, the Commissioner shall investigate whether the employer has in fact violated G.S. 64-26.

(b) Certain Complaints Shall Not Be Investigated. – The Commissioner shall not investigate complaints that are based solely on race, religion, gender, ethnicity, or national origin.

(c) Assistance by Law Enforcement. – The Commissioner may request that the State Bureau of Investigation assist in investigating a complaint under this section.

(d) Subpoena for Production of Documents. – The Commissioner may issue a subpoena for production of employment records that relate to the recruitment, hiring, employment, or termination policies, practices, or acts of employment as part of the investigation of a valid complaint under this section.

§ 64-30. Actions to be taken; hearing.

If, after an investigation, the Commissioner determines that the complaint is not false and frivolous:

- (1) The Commissioner shall hold a hearing to determine if a violation of G.S. 64-26 has occurred and, if appropriate, impose civil penalties in accordance with the provisions of this Article.

- (2) If, during the course of the hearing required by subdivision (1) of this section, the Commissioner concludes that there is a reasonable likelihood that an employee is an unauthorized alien, the Commissioner shall notify the following entities of the possible presence of an unauthorized alien:
- a. United States Immigration and Customs Enforcement.
 - b. Local law enforcement agencies.

§ 64-31. Consequences of first violation.

(a) Affidavit Must Be Filed. – For a first violation of G.S. 64-26, the Commissioner shall order the employer to file a signed sworn affidavit with the Commissioner within three business days after the order issued pursuant to this subsection is issued. The affidavit shall state with specificity that the employer has, after consultation with the employee, requested a verification of work authorization through E-Verify.

(b) Effect of Failure to File Affidavit. – If an employer fails to timely file an affidavit required by subsection (a) of this section or by G.S. 64-32 or G.S. 64-33, the Commissioner shall order the employer to pay a civil penalty of ten thousand dollars (\$10,000).

§ 64-32. Consequences of second violation.

For a violation of G.S. 64-26 that occurs after an order has been issued pursuant to G.S. 64-31, the Commissioner shall order the measures required by G.S. 64-31(a) and shall also order the employer to pay a civil penalty of one thousand dollars (\$1,000), regardless of the number of required employee verifications the employer failed to make.

§ 64-33. Consequences of third or subsequent violation.

For a violation of G.S. 64-26 that occurs after an order has been issued pursuant to G.S. 64-32, the Commissioner shall order the measures required by G.S. 64-31(a), and shall also order the employer to pay a civil penalty of two thousand dollars (\$2,000) for each required employee verification the employer failed to make.

§ 64-34. Commissioner to maintain copies of orders.

The Commissioner shall maintain copies of orders issued pursuant to G.S. 64-31, 64-32, and 64-33, and shall maintain a database of the employers and business locations that have a violation of G.S. 64-26 and make the orders available on the Commissioner's Web site.

§ 64-35. Work authorization shall be verified through the federal government.

When investigating a complaint under this Article, the Commissioner shall verify the work authorization of the alleged unauthorized alien with the federal government pursuant to 8 U.S.C. § 1373(c). The Commissioner shall not attempt to independently make a final determination of whether an alien is authorized to work in the United States.

§ 64-36. Appeal of Commissioner's order.

A determination by the Commissioner pursuant to this Article shall be final, unless within 15 days after receipt of notice thereof by certified mail with return receipt, by signature confirmation as provided by the U.S. Postal Service, by a designated delivery service authorized pursuant to 26 U.S.C. § 7502(f)(2) with delivery receipt, or via hand delivery, the employer charged with the violation takes exception to the determination, in which event final determination shall be made in an administrative proceeding pursuant to Article 3 of Chapter 150B of the General Statutes and in a judicial proceeding pursuant to Article 4 of Chapter 150B of the General Statutes.

§ 64-37. Rules.

The Commissioner may adopt rules needed to implement this Article.

§ 64-38. Article does not require action that is contrary to federal or State law.

This Article shall not be construed to require an employer to take any action that the employer believes in good faith would violate federal or State law.

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2025

RFP Number (if applicable): _____

Name of Vendor or Bidder: _____

**IRAN DIVESTMENT ACT CERTIFICATION
REQUIRED BY N.C.G.S. 143C-6A-5(a)**

As of the date listed below, the vendor or bidder listed above is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4.

The undersigned hereby certifies that he or she is authorized by the vendor or bidder listed above to make the foregoing statement.

Signature	Date

Printed Name	Title

Notes to persons signing this form:

N.C.G.S. 143C-6A-5(a) requires this certification for bids or contracts with the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina. The certification is required at the following times:

- When a bid is submitted
- When a contract is entered into (if the certification was not already made when the vendor made its bid)
- When a contract is renewed or assigned

N.C.G.S. 143C-6A-5(b) requires that contractors with the State, a North Carolina local government, or any other political subdivision of the State of North Carolina must not utilize any subcontractor found on the State Treasurer's Final Divestment List.

The State Treasurer's Final Divestment List can be found on the State Treasurer's website at the address www.nctreasurer.com/iran and will be updated every 180 days.

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2025

Companies Boycotting Israel Divestment Act Certification Form

RFP/RFQ Number (if applicable): _____

Name of Contracting Party or Bidder: _____

**COMPANIES BOYCOTTING ISRAEL DIVESTMENT ACT CERTIFICATION
REQUIRED BY N.C.G.S. §147-86.81et seq. ***

Pursuant to N.C.G.S. §147-86.81, any person identified as engaging in a boycott of Israel, as defined by this Act. In addition, State agencies must divest from investments in such restricted companies, determined by appearing on the Final Divestment List created by the State Treasurer pursuant to G.S. 147-86.81, is ineligible to contract with the State of North Carolina or any political subdivision of the State.

As of the date listed below, the supplier or bidder listed above is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. §147-86.81.

The undersigned hereby certifies that he or she is authorized by the contracting party or bidder listed above to make the foregoing statement.

Signature

Date

Printed Name

Title

N.C.G.S. §147-86.81 requires this certification for bids or contracts with the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina. The certification is required at the following times:

- When a bid is submitted
- When a contract is entered into (if the certification was not already made when the vendor made its bid)
- When a contract is renewed or assigned

N.C.G.S. § 147-86.81(b) requires that contractors with the State, a North Carolina local government, or any other political subdivision of the State of North Carolina must not utilize any subcontractor found on the State Treasurer's Final Divestment List.

The State Treasurer's Final Divestment List can be found on the State Treasurer's website at: <https://www.nctreasurer.com/inside-the-department/OpenGovernment/Pages/Divestment-Acts-Resources.aspx> and will be updated every 180 days.

* Note: Enacted by Session Law 2017-193 as N.C.G.S. §147-86.81et seq.



CERTIFICATION REGARDING CONFLICT OF INTEREST

The Submitter is required to certify that performance of the work will not create any conflicts of interest or disclose any actual or potential conflicts of interest by completing and signing one of the following statements:

All Vendors should be aware of OWASA'S Code of Ethics, which prohibits OWASA Employees and Board Members from having certain relationships with persons or entities conducting (or proposing to conduct) business with OWASA and which prohibits the acceptance of gifts from Vendors. If the Vendor has an actual or potential conflict, the Vendor shall disclose any Conflict of Interest that may exist.

Conflicts of Interest (Potential or actual) will be evaluated by OWASA'S General Counsel to determine the proper course of action. Failure to comply with the provisions established above may render the vendor ineligible to participate in OWASA'S procurement process.

The Submitter hereby discloses no conflicts of interest.

DATE: _____

AUTHORIZED SIGNATURE: _____

TITLE: _____

SUBMITTER/COMPANY NAME: _____

OR

The Submitter hereby discloses the following circumstances that could give rise to a conflict of interest for the Submitter, any affiliates, any proposed subconsultants, and key personnel of any of these organizations. (Attach additional sheets as needed.)

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

Name of the Individual/Company to which potential conflict of interest might apply:

Nature of potential conflict of interest:

Proposed Remedy:

DATE: _____

AUTHORIZED SIGNATURE: _____

TITLE: _____

SUBMITTER/COMPANY NAME: _____

CIP NO.: 375-02
PROJECT: Burning Tree Water Line Replacement
DATE: April 2026

DOCUMENT 00 91 13

ADDENDA

ADDENDUM NUMBER [_____]

DATE: _____

PROJECT: Burning Tree Water Line Replacement

OWASA CIP NUMBER: 375 - 02

OWNER: ORANGE WATER AND SEWER AUTHORITY

ENGINEER: _____

TO: _____

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated _____, Addendum Number _____ issued _____, with amendments and additions noted herein below.

Acknowledge receipt of this Addendum in the space provided in the Bid form. Failure to do so may disqualify the Bidder.

This Addendum consists of _____ pages:

CHANGES TO THE SPECIFICATIONS:

1. _____.

CHANGES TO THE DRAWINGS:

1. DRAWING ____- _____

-END OF DOCUMENT-

SECTION 00 91 13 - Addenda
00 91 13-1



Orange Water & Sewer Authority

Burning Tree Water Line
Replacement

*****THIS DOCUMENT HAS BEEN EDITED AND REVISED BY ORANGE WATER AND SEWER
AUTHORITY UNDER PERMISSION FROM THE ENGINEERS JOINT CONTRACT DOCUMENTS
COMMITTEE, MAY 5, 2014*****

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



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

Copyright © 2013:

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

The copyright for this document is owned jointly by the three sponsoring organizations listed above. The National Society of Professional Engineers is the Copyright Administrator for the EJCDC documents; please direct all inquiries regarding EJCDC copyrights to NSPE.

NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms	1
1.02 Terminology	5
Article 2 – Preliminary Matters	7
2.01 Delivery of Bonds and Evidence of Insurance	7
2.02 Copies of Documents	7
2.03 Before Starting Construction	7
2.04 Preconstruction Conference; Designation of Authorized Representatives	8
2.05 Initial Acceptance of Schedules	8
2.06 Electronic Transmittals	8
Article 3 – Documents: Intent, Requirements, Reuse	9
3.01 Intent	9
3.02 Reference Standards	9
3.03 Reporting and Resolving Discrepancies	9
3.04 Requirements of the Contract Documents	11
3.05 Reuse of Documents	12
Article 4 – Commencement and Progress of the Work	12
4.01 Commencement of Contract Times; Notice to Proceed	12
4.02 Starting the Work	12
4.03 Reference Points	12
4.04 Progress Schedule	13
4.05 Delays in Contractor’s Progress	13
Article 5 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions	14
5.01 Availability of Lands	14
5.02 Use of Site and Other Areas	15
5.03 Subsurface and Physical Conditions	16
5.04 Differing Subsurface or Physical Conditions	17
5.05 Underground Facilities	18

5.06	Hazardous Environmental Conditions at Site	19
Article 6 – Bonds and Insurance		21
6.01	Performance, Payment, and Other Bonds	21
6.02	Insurance—General Provisions	22
6.03	Contractor’s Insurance	24
6.04	Owner’s Liability Insurance	29
6.05	Property Insurance.....	29
6.06	Waiver of Rights	31
6.07	Receipt and Application of Property Insurance Proceeds	32
Article 7 – Contractor’s Responsibilities		32
7.01	Supervision and Superintendence	32
7.02	Labor; Working Hours	32
7.03	Services, Materials, and Equipment.....	33
7.04	“Or Equals”	33
7.05	Substitutes	34
7.06	Concerning Subcontractors, Suppliers, and Others	36
7.07	Patent Fees and Royalties	37
7.08	Permits	38
7.09	Taxes	38
7.10	Laws and Regulations.....	39
7.11	Record Documents.....	39
7.12	Safety and Protection.....	40
7.13	Safety Representative	41
7.14	Hazard Communication Programs	41
7.15	Emergencies	41
7.16	Shop Drawings, Samples, and Other Submittals.....	42
7.17	Contractor’s General Warranty and Guarantee.....	44
7.18	Indemnification	44
7.19	Delegation of Professional Design Services	46
Article 8 – Other Work at the Site		47
8.01	Other Work	47
8.02	Coordination	47
8.03	Legal Relationships.....	48

Article 9 – Owner’s Responsibilities.....	49
9.01 Communications to Contractor.....	49
9.02 Replacement of Engineer	49
9.03 Furnish Data	49
9.04 Pay When Due.....	49
9.05 Lands and Easements; Reports, Tests, and Drawings	49
9.06 Insurance	49
9.07 Change Orders.....	49
9.08 Inspections, Tests, and Approvals	49
9.09 Limitations on Owner’s Responsibilities	50
9.10 Undisclosed Hazardous Environmental Condition.....	50
9.11 Evidence of Financial Arrangements.....	50
9.12 Safety Programs	50
Article 10 – Engineer’s Status During Construction.....	50
10.01 Owner’s Representative.....	50
10.02 Visits to Site.....	50
10.03 Project Representative.....	51
10.04 Rejecting Defective Work.....	54
10.05 Shop Drawings, Change Orders and Payments.....	54
10.06 Determinations for Unit Price Work	54
10.07 Decisions on Requirements of Contract Documents and Acceptability of Work	54
10.08 Limitations on Engineer’s Authority and Responsibilities.....	54
10.09 Compliance with Safety Program.....	55
Article 11 – Amending the Contract Documents; Changes in the Work	55
11.01 Amending and Supplementing Contract Documents	55
11.02 Owner-Authorized Changes in the Work	55
11.03 Unauthorized Changes in the Work.....	56
11.04 Change of Contract Price	56
11.05 Change of Contract Times	57
11.06 Change Proposals	58
11.07 Execution of Change Orders.....	58
11.08 Notification to Surety.....	59
Article 12 – Claims.....	59

12.01	Claims	59
Article 13 – Cost of the Work; Allowances; Unit Price Work.....		60
13.01	Cost of the Work	60
13.02	Allowances	63
13.03	Unit Price Work	64
Article 14 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....		65
14.01	Access to Work.....	65
14.02	Tests, Inspections, and Approvals.....	66
14.03	Defective Work.....	66
14.04	Acceptance of Defective Work.....	67
14.05	Uncovering Work	67
14.06	Owner May Stop the Work	68
14.07	Owner May Correct Defective Work.....	68
Article 15 – Payments to Contractor; Set-Offs; Completion; Correction Period		69
15.01	Progress Payments	69
15.02	Contractor’s Warranty of Title	72
15.03	Substantial Completion	72
15.04	Partial Use or Occupancy	73
15.05	Final Inspection	74
15.06	Final Payment.....	74
15.07	Waiver of Claims	75
15.08	Correction Period	76
Article 16 – Suspension of Work and Termination		76
16.01	Owner May Suspend Work	76
16.02	Owner May Terminate for Cause	77
16.03	Owner May Terminate For Convenience	78
16.04	Contractor May Stop Work or Terminate	79
Article 17 – Final Resolution of Disputes		79
17.01	Methods and Procedures.....	79
Article 18 – Miscellaneous		80
18.01	Giving Notice	80
18.02	Computation of Times.....	81
18.03	Cumulative Remedies	81

18.04	Limitation of Damages	81
18.05	No Waiver	81
18.06	Survival of Obligations	81
18.07	Controlling Law	81
18.08	Headings.....	81

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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the 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. ***Document* – A specific section of the Project Manual or a reference to a specific section of the Project Manual as noted with the accompanying numeric reference.**
20. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
21. *Engineer*—The individual or entity named as such in the Agreement.
22. *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.
23. ***Geotechnical Data Report (GDR)* — The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR’s content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not**

operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
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 the 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. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, ~~Supplementary Conditions~~, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
34. **Property Owner – The individual, partnership, co-partnership, limited liability corporation firm, company, corporation, unincorporated association, organization, joint stock company, trust, estate, institution, governmental entity, or any other entity that owns the property, or controls management or activities of the property where Work or a portion of the Work is performed.**
35. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site, **or any part thereof to make any and all observations of the Work performed, acting under direct supervision of the Engineer.** As used herein,

the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.

36. *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.
37. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
38. *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.
39. *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.
40. *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 furnished by Owner which are designated for the use of Contractor.
41. *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.
42. *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.
43. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, **and approved by the Owner**, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
44. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
45. **Superintendent – The authorized representative of the Contractor who is assigned to oversee the work forces responsible for performing the Work in accordance with the Contract Documents.**
46. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions. **[Supplementary Conditions have been inserted in the EJCDC General Conditions. Any deletions to the standard C-700 language are noted by having a line drawn through them (i.e. interlining; ex. Supplementary. Any added (supplementary) language is noted by the text being in bold font and underlined (this sentence being an example).]**
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

48. *Technical Data*—Those items expressly identified as Technical Data in the ~~Supplementary~~ **General** Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
49. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
50. *Unit Price Work*—Work to be paid for on the basis of unit prices.
51. *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.
52. *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 the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day:*

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

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

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

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. 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. 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.

G. ***Include:***

1. **The word “include” in its various forms and derivatives shall mean ‘without limitation’ unless the context otherwise requires.**

H. ***Persistently Fails:***

1. **The expression ‘persistently fails’ and other similar expressions, as used in reference to the Contractor, shall mean any act or omission which causes Owner or Engineer to reasonably conclude that Contractor will not complete the Work within the Contract Times or Contract Price, or in substantial compliance with the requirements of the Contract Documents.**

G. ***Pronouns, Numbers, and Titles:***

1. **Unless the context otherwise requires all personal pronouns used in the Contract Documents shall include all other genders, and the singular shall include the plural**

and vice versa. Titles and headings of articles, paragraphs, subparagraphs, sections, subsections, parts, subparts, etc., in the Contract Documents are for convenience only, and neither limit nor amplify the provisions.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. ~~*Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.~~

***Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.**

- C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the ~~Supplementary~~ **General** Conditions or otherwise), 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~~ **free of charge, 10 copies of the Contract Documents** (including one fully executed 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 specifically 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.

- B. **Priority List of Sites: The priority list of Sites for the Project shall be approved by the Engineer or the Resident Project Representative. Orange Water and Sewer Authority reserves the right to alter the priority list of Sites. The Contractor will be given notice in writing of any change in the priority list of Sites.**

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 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

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

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the 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 Documents issued pursuant to Paragraph 11.01.

- a. The accuracy or exactness of grades, elevations, dimensions, or locations given or any Drawings or the Work installed by other contractors, is not guaranteed by Owner.
- b. Included under Contractor's duty under the first sentence of Paragraph 3.03.A.1 are:
 - 1) to satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations, and
 - 2) in all cases of interconnection of the Work to be done by Contractor with the rest of the Project, it shall verify at the Site all dimensions needed to make proper interconnections.
- c. Contractor shall promptly rectify all errors due to its failure to so verify all such grades, elevations, locations, or dimensions without additional cost to Owner. No extra charges or compensation shall be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings.
- d. Contractor acknowledges:
 - 1) the Contract Documents are sufficient to determine the cost of the Work;
 - 2) it has had sufficient opportunity to visit the Site and to examine all conditions, including subsurface and physical conditions affecting the Work;
 - 3) it has had sufficient opportunity to examine the Contract Documents for errors, inconsistencies, and omissions;
 - 4) the Contract Documents are complete and unambiguous;
 - 5) the Contract Times are reasonable and sufficient to complete the Work.
- e. If the statements in Paragraph 3.03.A.1.d are not accurate, Contractor accepts any risk in connection with making them.
- f. Contractor shall evaluate and satisfy itself as to the conditions and limitations under which the Work is to be performed, including (to the extent they are pertinent):
 - 1) the location, condition, layout, and nature of the Site and surrounding area;
 - 2) generally prevailing climatic conditions;
 - 3) anticipated labor supply costs;
 - 4) availability and cost of materials, tools, and equipment, and
 - 5) other similar issues.
- g. To the extent that it may be appropriate for the proper execution of its subcontract, Contractor shall cause each Subcontractor to do the evaluation described in Paragraph 3.03.A.1.f.

- h. **Owner will not be required to make any adjustment in the Contract Times or the Contract Price in connection with any failure by Contractor to comply with Paragraph 3.03.A.**

- 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 Documents 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, **unless otherwise provided in the Contract Documents, or by Laws or Regulations, or common law.**

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 shall 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).
- 2. **Owner and Contractor shall do all acts, and shall make, execute, and deliver such written instruments, as shall from time to time be reasonably required to carry out the provisions of the Contract Documents, or between the Contract Documents and applicable standards, specifications, manuals, or Laws or Regulations cannot be resolved by use of provisions of the Contract Documents as described in Paragraph 3.03.B.1, Contractor shall:**
 - a. **provide the better quality or greater quantity of Work or**
 - b. **comply with the more stringent requirement**
- 3. **Paragraph 3.03.B.2 shall not relieve the Contractor of any obligations otherwise imposed on it.**

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 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 thereunder.

- 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 give written notice to Owner and Contractor 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 editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 - 4. acts of war or terrorism.
- D. 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.

- E. Paragraph 8.03 governs 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.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times 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.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- 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.
- D. **The Owner will obtain a right-of-entry for each Site located on private property. No Work shall commence on a private property Site until the Contractor has been given a copy of the executed right-of-entry for that Site and the Contractor has been given permission to begin Work on the Site from the Engineer or Resident Project Representative. The Owner is solely responsible for obtaining rights-of-entry.**
- E. **The Contractor shall have no more than one (1) uncompleted Site ongoing at any time, unless authorized by the Engineer or Resident Project Representative. Prior to moving to the next Site, the Contractor shall receive permission from the Engineer or Resident Project Representative.**
- F. **The Owner will obtain all encroachment agreements necessary for the completion of the Work. The Contractor shall become familiarized with all the provisions of the encroachment agreements, if any, required for the Contract. The Engineer or Resident Project Representative will provide copies of the encroachment agreements. The Owner is solely responsible for obtaining encroachment agreements.**
- G. **Public Notice and Advisory: The Contractor shall notify individual or entities anticipated to be affected by the Work. Notice shall be written and provided to the recipient no less than two (2) days prior to commencing Site construction. Notice shall be delivered in person, door knob hanger, or letter and shall include the following information:**
 - 1. **nature and schedule of the Work;**
 - 2. **name and telephone number of a contact person; and**

3. any additional necessary information or instructions.

H. The Engineer or Resident Project Representative will approve any notice prior to commencement of construction.

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; 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 7.12, 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 at law; 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 shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site 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~~ **General** Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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~~ **General** 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

C.

D. **Reliance by Contractor on Technical Data Authorized:**

Contractor may rely upon the accuracy of the Technical Data contained in such reports and drawings, but such reports and drawings are not Contract Documents. 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; or**
2. **other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or**
3. **any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.**

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 either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the ~~Supplementary~~ **General** Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not shown or indicated 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), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; 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 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. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The ~~Supplementary~~ General Conditions identify:
 - ~~1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and~~
 - ~~2. Technical Data contained in such reports and drawings.~~

No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

- 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or~~
 - ~~2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or~~
 - ~~3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.~~
- C. Contractor shall not be responsible for 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 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.
- 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 or 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.H shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period

EJCDC® C-700, Standard General Conditions of the Construction Contract.

specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, ~~the Supplementary Conditions~~, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the ~~Supplementary~~ **General** Conditions or other specific provisions of the Contract.

- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within ~~20~~ **five (5)** days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 Insurance—General Provisions

- A. ~~Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.~~ **Wherever in this Article the terms "The Insured" and Owner occurs with respect to coverage in a policy, it shall mean the Owner and its agent and agencies, all municipalities where Work is being performed under the Contract, the Engineer, and any other parties specifically designated herein, who shall be named as insured in each policy issued. The insurance policies required herein shall not contain any Third Party Beneficiary Exclusion.**
- 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 **of North Carolina**, 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~~ **General** Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
 - 1. **Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.**

2. **Both the certificates of insurance and additional insured endorsement shall be originals and shall be approved by the Owner's Finance Director before Contractor can begin Work under this Contract.**
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, ~~in the Supplementary Conditions, or elsewhere in the Contract~~), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. ~~Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.~~
- E. ~~Failure of Owner or Contractor to demand such certificates or other evidence of the other party's Contractor's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the Contractor's other party's obligation to obtain and maintain such insurance.~~
- F. ~~If either party Contractor does not purchase or maintain all of the insurance required of such party by the Contract, such party Contractor shall notify the other party Owner 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.~~
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.
- K. **The Contractor shall not commence Work under the Contract until it has obtained all insurance required under this Article and the Owner has approved such insurance, nor shall the Contractor allow any Subcontractor to commence Work on its Subcontract until all similar insurance required of the Subcontractor has been so obtained and approved.**

Evidence of the required coverage shall be submitted not later than fifteen (15) days from delivery of the Notice of Award to Contractor.

- L. Provision of some types of insurance by a Subcontractor may be waived, at the option of the Owner, where it is deemed that adequate coverage is provided by the Contractor's insurance.
- M. Subcontractors must, in all cases, provide Workers' Compensation and Employer's Liability Insurance and Motor Vehicle Liability Insurance.
- N. One (1) copy of each such insurance policy and certificates indicating each type of coverage mentioned, and the correlation between the insurance furnished and that required, shall be filed with each of The Insured.
- O. All policies relating to this Contract shall be so written that each of The Insured shall be notified by the carrier of cancellation or change at least thirty (30) days prior to the effective date of such cancellation or change. Renewal certificates covering the renewal of all policies expiring during the life of the Contract shall be filed with each of The Insured not less than sixty days before the expiration of such policies.
- P. Contractor shall notify Owner of the filing of any claim arising from Work under the Contract within thirty (30) days of the filing of such claim.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. ~~United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).~~
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 - 2. claims for damages insured by reasonably available personal injury liability coverage.
 - 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
 - 1. Products and completed operations coverage:
 - a. ~~Such insurance shall be maintained for three years after final payment.~~

- b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary General Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 - ~~7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.~~
 - ~~8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.~~
- D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary General Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial

Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article ~~and in the Supplementary Conditions~~, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.
- K. **The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:**
 1. **Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:**

<u>State:</u>	<u>Statutory</u>
<u>Federal, if applicable (e.g., Longshoreman's):</u>	<u>Statutory</u>
<u>Jones Act coverage, if applicable:</u>	
<u>Bodily injury by accident, each accident</u>	<u>\$ N/A</u>
<u>Bodily injury by disease, aggregate</u>	<u>\$ N/A</u>
<u>Employer's Liability:</u>	
<u>Bodily injury, each accident</u>	<u>\$ 500,000</u>
<u>Bodily injury by disease, each employee</u>	<u>\$ 500,000</u>
<u>Bodily injury/disease aggregate</u>	<u>\$ 500,000</u>
<u>For Work performed in monopolistic states, stop-gap liability coverage shall be endorsed</u>	<u>\$ N/A</u>

to either the worker's compensation or
commercial general liability policy with a
minimum limit of:

Foreign voluntary worker compensation

Statutory

**2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the
General Conditions:**

General Aggregate \$ 2,000,000

Products - Completed Operations
Aggregate \$ 2,000,000

Personal and Advertising Injury \$ 1,000,000

Each Occurrence (Bodily Injury and
Property Damage) \$ 1,000,000

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person \$ 1,000,000

Each accident \$ 1,000,000

Property Damage:

Each accident \$ 1,000,000

Combined Single Limit of \$ 2,000,000

4. Excess or Umbrella Liability:

Per Occurrence \$ 10,000,000

General Aggregate \$ 10,000,000

5. Contractor's Pollution Liability:

Each Occurrence \$ 1,000,000

General Aggregate \$ 1,000,000



If box is checked, Contractor is not required to provide
Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insured the following: [INSERT ADDITIONAL NAMES]

7. Contractor's Professional Liability:

<u>Each Claim</u>	<u>\$ 500,000</u>
<u>Annual Aggregate</u>	<u>\$ 500,000</u>

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the ~~Supplementary~~ **General** Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the ~~Supplementary~~ **General** Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the ~~Supplementary~~ **General** Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, ~~and any corresponding Supplementary Conditions~~, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; ~~earthquake; volcanic activity, and other earth movement; flood~~; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the ~~Supplementary~~ **General** Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 - ~~12. include performance/hot testing and start-up.~~
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
 14. **include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorney's fees and engineering or other consultants' fees, if not otherwise covered.**
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least **thirty (30)** ~~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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

- E. *Additional Insurance*: 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. ~~All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.~~
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the ~~Supplementary~~

General 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.
- C. **Except as otherwise provided in the Contract Documents or when direct communications have been specifically authorized, Owner and Contractor shall communicate through Engineer. Communications by and with Engineer's consultants shall be through Engineer.**

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, 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.

1. Refer to Appendix D.
 2. Requests to Work during other than regular working hours or on legal holidays must be submitted to the Owner at least 48 hours in advance of the period proposed for such Work and shall set forth the proposed schedule for such Work to give the Owner ample time to arrange for appropriate personnel to be at the site of the Work.
 3. Owner's legal holidays are New Year's Day, Martin Luther King, Jr. Day, Good Friday, Memorial Day, Juneteenth, Independence Day, Labor Day, Thanksgiving (2 days) and Christmas (3 days) for a total of 12 holidays. However, emergency work may be done without prior permission.
- C. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.
1. For purposes of administering the foregoing requirement, additional overtime costs are defined as charges calculated in accordance with the terms of Engineer's Agreements with Owner.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. Engineer may reject any material and equipment delivered to the Site without the approval of satisfactory evidence required by the Contract Documents.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the 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 material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an “or equal” item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- 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 shall result in any change in Contract Price. The Engineer’s denial of an “or-equal” request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.
- G. **Any materials and equipment required to be approved by the Engineer that is installed on the Project without such approval is subject to removal, disposal, and replacement by the Contractor as Contractor's expense.**

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract 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, Supplier, or other individual or entity 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 five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate **written** contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights, trade secrets, proprietary information, or copyrights held by others, whether or not particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work, and whether or not Engineer, or Owner, or consultants, contractors, agents, and employees of either of them are aware of such patent rights, trade secrets, proprietary information, and copyrights. ~~If a particular invention, design, process,~~

product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

- B. ~~To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.~~
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of 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.

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.
- B. **Owner must comply with the "Procedures for Reporting North Carolina Sales Tax Expenditures. The following procedure in handling the North Carolina Sales Tax is applicable to this Project.**
 - 1. **It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales tax paid by the Contractor and each of its Subcontractors with each payment request in a format approved by the Owner.**
 - 2. **The documentary evidence shall consist of a certified statement, by the Contractor and each of its Subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes paid each vendor. Certified statements must show the invoice number or numbers, covered and inclusive dates of such invoices.**

3. Materials used from the Contractor's or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
4. The Contractor shall not be required to certify the Subcontractor's statements.
5. The documentary evidence to be furnished to Owners eligible for sales or use tax refunds covers sales and/or use taxes paid on building materials used by Contractor(s) and Subcontractors in the performance of Contracts with churches, orphanages, hospitals not operated for profit and other charitable or religious institutions or organizations not operated for profit and, incorporated cities, towns, and counties in this State. The documentary evidence is to be submitted to the above-named institutions, organizations and governmental units to be included in claims for refunds to be prepared and submitted by them to obtain refunds provided by G.S. 105-164.14(2) and (3) of the 1961 Statute, and is to include the purchases of building materials, supplies, fixtures, and equipment which become a part of or annex to buildings or structures being erected, altered or repaired under Contracts with such institutions, organizations or governmental units.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.~~
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing Work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or Work in progress.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The ~~Supplementary~~ **General** Conditions identify any Owner's safety programs that are applicable to the Work. **The following Owner safety programs are applicable to the Work and can be provided upon request: Orange Water and Sewer Authority Safety Manual, dated August 2022.**
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor 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).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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

H. **Existing Utilities**

1. **The Owner and Engineer have, to the best of their ability, shown the existing utilities and obstructions (water, sewer, electrical, gas, telephone, cable TV, storm drainage, etc.) that may be affected by the Work. Contractor shall, at Contractor's expense, locate all existing utilities that may be encountered during the Work. Contractor shall make every effort to avoid damage or disruption of services during the Work.**
2. **Contractor shall contact the North Carolina One-Call Center to coordinate existing utility location prior to commencement of any Work. North Carolina On-Call Center (800) 632-4949. www.ncocc.org**

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

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

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 threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.
- B. **Contractor shall promptly report in writing to Owner and Engineer all accidents or incidents arising out of or in connection with the Work which cause death, personal injury, or property damage, giving full details and statements of any witnessed. In addition, if death, serious personal injury, or serious property damage is caused, Contractor shall report the accident or incident immediately by telephone or messenger to Owner and Engineer. Contractor shall give Owner and Engineer reasonable advanced notice before using or placing explosives or other hazardous materials or equipment on Site.**
- C. Notwithstanding anything else in this Contract, while federal, state, or local state(s) of emergency are in effect, or when a public health emergency has been declared, Contractor shall comply with all guidance and recommendations of the Centers for Disease Control, the State of North Carolina, Town of Carrboro, Town of Chapel Hill, or Orange County, unless mutually agreed to by Owner and Contractor.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

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.D.

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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction 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 shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 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.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.
- E. *Resubmittal Procedures:*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, 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 submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

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

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.
- D. 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 shall 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 and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent~~

~~act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.~~

To the maximum extent allowed by Laws and regulations, Contractor shall defend, indemnify, and save harmless Indemnities from and against all Charges that arise in any manner from, in connection with, or out of, performance of the Work as a result of acts or omissions of Contractor, any Subcontractor, any Supplier, or any person or organization directly or indirectly employed by any of them or any entity for whose acts any of them may be liable. In performing its duties under Paragraph 7.18.A, Contractor shall at its sole expense defend Indemnitees with legal counsel reasonably acceptable to Owner.

- 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 shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.~~

Definitions: As used in Paragraph 7.18.A above and Paragraphs 7.18.C and 7.18.D below:

1. **'Charges' means claims, judgments, costs, damages, losses, demands, liabilities, obligations, fines, penalties, royalties, settlements, and expenses. Included within 'Charges' are:**
 - a. **interest and reasonable attorney's fees assessed as part of any such item;**
 - b. **amounts for alleged violations of sedimentation pollution or other environmental or pollution laws or regulations – including any such alleged violations that arises out of the handling, transportation, deposit, or delivery of the items or materials that are involved in performance of the Work.**
 - c. **amounts related to Hazardous Environmental Conditions; and**
 - d. **amounts related to alleged infringement of patent rights, trade secrets, proprietary information, or copyrights.**
 2. **'Indemnitees' means Owner and Engineer and officers, officials, independent contractors, agents, and employees of Owner and Engineer, but does not include Contractor.**
- C. ~~The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:~~
- ~~1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or~~
 - ~~2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.~~

Limitations of Contractor's Obligation: Neither Paragraph 7.18.A nor any other provision of the Contract Documents shall be construed to require Contractor to indemnify or hold harmless Indemnitees against liability for damages arising out of bodily injury to persons

or damage to property proximately caused by or resulting from the negligence, in whole or in part, of Indemnitees.

- D. Nothing in Paragraphs 7.18.A, 7.18.B, or 7.18.C shall affect any warranties in favor of the Owner. This Paragraph 7.18.D is in addition to, and Paragraphs 7.18.A and 7.18.B above shall be construed separately from, any other indemnification provisions that may be in the Contract Documents. This Paragraph 7.18 shall remain in force despite termination of this Agreement (whether by expiration of the term or otherwise) and termination of the services of the Contractor under this Contract, but this sentence does not imply that other provisions in the Contract Documents do not survive termination.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

7.20 **NSF Requirements**

- A. The following materials which will be in contact with water before or during the treatment process, water to be added, or returned to the treatment process, or potable water, shall have been tested and certified to meet the requirements of ANSI/NSF 60 or ANSI/NSF 61. The materials shall be guaranteed by the manufacturer to have the required certification and to be suitable for the intended service. Evidence of the certification shall be submitted to the Engineer with the appropriate drawings and data. Any materials which cannot be so guaranteed, whether or not specified by manufacturer and product designation, shall not be used.
1. Chemical treatment additives.

2. Pipes and related products (including coated and uncoated pipe, fittings, small storage devices, tubing, and screens).
3. Protective (barrier) materials (including paints, coatings, linings, and diaphragms).
4. Joints and sealing materials (including gaskets, sealing materials, and lubricants).
5. Process media (including media used in ion exchange, aeration, adsorption, oxidation, and filter operations).
6. Mechanical devices (including chemical feeders, pumps, valves, aeration equipment, clarifiers, mixers, strainers, and other water treatment process devices).
7. Mechanical plumbing products.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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~~ Article 8, 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 Article 8, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner 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, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.
- D. 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 shall be that of the former Engineer.~~

If Owner appoints a substitute Engineer, the substitute Engineer shall have the same status under the Contract Documents as 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 Documents (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.

9.13 **Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work**

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. **The action of the Engineer in performance if these duties shall not be construed to make the Engineer the agent for the Owner with respect to changes in the Cost of Work or changes in the Contract Documents.**

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 10.08. 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 *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~~ **General** Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the **General** Conditions.
- B. **The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
1. **General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.**
 2. **Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.**
 3. **Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.**
 4. **Liaison:**
 - a. **Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.**
 - b. **Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.**
 - c. **Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.**
 5. **Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.**
 6. **Shop Drawings and Samples:**
 - a. **Record date of receipt of Samples and Contractor-approved Shop Drawings.**
 - b. **Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.**

- c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
- 7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- 10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
 - b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - c. Maintain records for use in preparing Project documentation.
- 11. Reports:
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

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

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

14. Completion:

a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.

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

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Contractor's Superintendent, Subcontractors, Suppliers, or expedite the Work.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's Work.

5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.

8. Authorize Owner to occupy the Project in whole or in part.

D. Paragraph 10.03.C shall not be construed to expand the Resident Project Representative's authority.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

10.08 *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, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
 - 3. *Field Orders:* 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall

be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake Work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

- B. The Owner reserves the right to add to the original scope of Unit Price Work of the Contract upon the same terms and at the same unit prices included in the Agreement for all unit item additions, provided that such additions will not result in an increase of more than fifty percent (50%) of the Original Contract Price. The Contractor may be entitled to an extension in the Contract Times with the addition of Unit Price Work.
- C. The Contractor shall perform emergency Work as required by the Owner. In such instances, the Engineer or Resident Project Representative will give written notice to the Contractor for each instance of emergency Work. The Contractor shall perform all emergency Work within seventy-two (72) hours of the written notice. The Owner may perform (or engage another Contractor to perform) emergency Work, at the Contractor's expense, if the Contractor fails to perform emergency Work within the time limit. If the Owner performs (or engages another Contractor to perform) the following conditions apply:
 - 1. if emergency Work is not a Unit Price Work item, the Owner shall charge all costs and expenses of the emergency Work, plus the Owner's then-current overhead charge to the Contractor and deduct those amounts from any monies due to Contractor on the then-current or then-future Application for Payment; and
 - 2. if emergency Work is a Unit Price Work item, the Owner will charge all applicable emergency Work unit costs, plus an administrative and overhead charge of one hundred dollars (\$100.00) per instance to the Contractor and deduct those amounts from any monies due the Contractor on the then-current or then-future Application for Payment.

11.03 *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.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or

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 11.04.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 11.04.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be ~~15 percent~~ ten percent (10%) and shall not be applied to payroll taxes, social security contributions, or unemployment taxes;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent **(5%)**;
 - 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 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of ~~15 percent~~ **ten percent (10%)** of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 **(excluding payroll taxes, security contributions, or unemployment taxes)** 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 five percent **(5%)** 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;~~
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 shall be submitted 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; and
 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work.

Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
- ~~4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.~~
5. Supplemental costs including the following:
 - ~~a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.~~
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. ~~Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.~~

Construction Equipment and Machinery:

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment,**

machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the current edition of the 'Compilation' of Rental Rates for Construction Equipment as published by the Associated Equipment Distributors. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include 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, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- ~~f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.~~
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- ~~h. Minor expenses such as 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 shall not include any of the following items:

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

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting, **and in accordance with Owner's and Engineer's instructions**, practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data. **The Owner and Engineer may specify additional or different requirements in accordance with the preceding sentence, but unless they so specify, the following is required in order to support a determination of cost of Work pursuant to Paragraph 13.01:**
1. **for costs under Paragraph 13.01.B.1, for each person who worked on the additional Work: a statement showing their job title, hourly rate paid or other method of compensation, other amounts described under Paragraph 13.01.B.1 that were paid, and the net change in the number of hours worked attributable to the change in the Work;**
 2. **for costs under Paragraph 13.01.B.2, dated receipts from the Subcontractors and/or Sub-subcontractors. The receipts must acknowledge the Contractor's payment, identify the materials, supplies, equipment, and show the name of the Owner's Project.**
 3. **for costs under Paragraph 13.01.B.5.c, dated receipts from the rental the Subcontractors and/or Sub-subcontractors. The receipts must acknowledge the Contractor's payment, identify the machinery and equipment, and show the name of the Owner's Project, the rental rate, and the number of hours, days, miles, or other basis of the charge. If the Contractor supplies the machinery or equipment, the statement must show the rental rate and the number of hours, days, miles, or other basis of the charge, and the rental rate must not exceed the market rental rate.**
 4. **for costs under Paragraph 13.01.B.5.i, written proof of a net change in the amount paid by the Contractor attributable to the change in the Work. For bonds, the proof must include the invoice or statement for the surety or its agent showing that it is attributable to the change in the Work.**

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 on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

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. **If Owner changes any estimate of quantity before the Agreement is executed, it may substitute the new estimated quantity in those calculations.** 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, **and cost for coordinating the Work with the Owner** 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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

- F. Each unit price shall be deemed to include an amount considered by the Contractor to be adequate to cover all construction surveying and existing utility location required to complete the Work as specified, or as directed by the Engineer, for each separately identified item.
- G. This Paragraph 13.03.G applies except to the extent if any that the Contract Documents specify otherwise:
1. Unit prices, if any, shall apply to Work done pursuant to Change Orders and to Work Change Directives.
 2. In addition to Paragraph 13.03.G.1, it is agreed:
 - a. If unit price items are included in the Contract Documents for Work other than Work done pursuant to Change Orders and to Work Change Directives, it is also agreed that the Contract Price was calculated on the assumption that certain estimated quantities of unit price items will be used in the Work. Those estimated quantities are stated in the Contract Documents. The unit price multiplied by the quantity is referred to as the 'extension';
 - b. If the actual extension of a unit price item is less than the estimated extension, the Contract Price shall be reduced accordingly;
 - c. The actual extension of each unit price item shall not exceed the estimated extension for that item unless the Contractor has received advance written approval from the Engineer to exceed the estimated quantity for that item. That approval may be limited in the Engineer's discretion. If that approval is given, the Contract Price shall be adjusted as follows:
 1. If the actual quantity of a unit price item is more than the estimated quantity, the Contract Price shall be increased to reflect the difference between the actual and the estimated quantities.
 2. If approval is not given, the Contractor shall not be obligated to use the quantity of that unit price item that exceeds the approved quantity, and a Change Order or Work Change Directive shall be executed to reflect the changes in the Work resulting from the actual quantity of the item that is used.
 3. If the Contract Documents explicitly and clearly state that no further approval from the Engineer or the Owner is required for the Contractor to exceed the estimated quantity of specified unit price items, then it is agreed that the Contract Price shall be adjusted to reflect the actual quantities of those items without the necessity of further approval.

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 will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

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~~ **the** 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 shall 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 shall 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 shall 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.
- G. **The Owner may engage an independent consultant for the direct inspection and administration of any or all of the Work to be performed in the Contract. This consultant shall act on the behalf of the Owner.**

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 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, **but in any event commencing within thirty (30) days after receipt of said instruction and proceeding promptly to completion**, 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. **Engineer and Owner may reject any defective Work, even if inspected and paid for, except to the extent accepted under Paragraph 14.04. A failure to disapprove or reject such defective Work does not constitute an acceptance.**
- 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 shall 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.
- B. **An acceptance of defective Work is not effective as an acceptance unless it specifically describes the condition that is defective and contains substantially the following statement: 'The Owner accepts [such condition] despite its being defective.'**

14.05 *Uncovering Work*

- A. Engineer has the authority to require special 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, **or contrary to the Contract Documents, or before required inspections, test, or approvals**, 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 Contractor shall not be entitled to any increase in Contract Times because of the time involved in such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction;** 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective. **However, if such Work had been prematurely covered, the preceding sentence shall not apply, and Contractor shall have no such rights.**

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, **or persistently fails to carry out the Work in accordance with the Contract Documents, or if Work interferes with the operation of the existing facility,** 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 shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven 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 **and provide** Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site **and storage locations referred to in the preceding sentence** 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 on account of 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. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, **including the transportation to the Work Site**, all of which must be satisfactory to Owner.
 - 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 - 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
 - 1. Engineer will, within **ten (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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 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~~ **any of the Work, whether or not paid for, is defective, except to the extent acceptable under Paragraph 14.04, or completed Work has been damaged**, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;

- c. Owner has been required to correct defective Work 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 **or reasonable grounds to believe in** the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.
- f. **there are reasonable grounds to believe that the Work cannot be completed for the unpaid balance of the Contract Price; or**
- g. **Contractor anticipates to owe damages or other amounts to Owner.**

D. *Payment Becomes Due:*

- 1. ~~Ten~~**Thirty (30)** 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;

- I. there are other items entitling 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 shall 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, **as determined in a competent jurisdiction having binding authority**, shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.
4. **Failure of Owner to refuse to make payment does not waive Owner's rights under the Contract Documents.**

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 seven days after the time of payment by Owner.
- B. **The Application of Payment shall be accompanied by such data, satisfactory to Owner, as will establish Owner's title to the material and equipment and protect its interest therein, including applicable insurance. Each subsequent Application for Payment shall include an Affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of Contractor's obligations reflected in prior Applications for Payment.**

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.
 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, shall 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 Article 15.**

2. **“Substantial Completion” means that the Work is complete to the point that the facility can properly operate, to the satisfaction of Owner, and Engineer. All process equipment shall be installed and operational. All work such as architectural, painting, final cleaning, rough site grading, sidewalks, etc. shall also be complete. Manufacturer’s field services and performance testing shall have been provided in accordance with the contract requirements. The intent of “Substantial Completion” is for all contract work to be complete except for minor punch list work.**
 3. **Punch list work includes minor portions of the Work not essential to operation of the facility. Completion of this work can be accomplished without interruption to facility operations. Any such Work will be listed on an attachment to the certificate of Substantial Completion and could include such items as permanent fencing, finish grading, seeding and the removal of temporary access roads and contractor’s mobilization areas.**
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall 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 seven 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), **including the time within each of those items shall 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*
- 1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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.
 - 2. **Without extra charge to Contractor, Engineer will make only two (2) such inspections to determine final completion. If Engineer is not able to make the representation and findings required to recommend final payment, successive inspections requested by Contractor shall be charged to Contractor.**
- C. *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.
- D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special

guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, **or the event after which**, Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

- B. **No adjustment shall be made to the extent that performance is, was, or would have been suspended, delayed, or interrupted directly or indirectly by Contractor or any Entity for which Contractor is responsible. The Contract Price shall not be adjusted except to the extent that the total of such suspensions exceed thirty (30) days and after excluding such thirty (30) day period.**

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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, ~~including fair and reasonable sums for overhead and profit on such Work;~~ **as determined in Article 13;**
 - 2. expenses sustained prior to the effective date of termination in ~~performing services and furnishing labor,~~ **ordering** 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, **the Owner shall have the options detailed in Paragraphs 16.03.A.2.a through 16.03.A.2.d;**
 - a. **Upon seven (7) days of receipt of the notice of termination for convenience Contractor shall provide evidence of materials ordered as described in Paragraph 16.03.A.2, including an itemized list, cost, order, and delivery dates, and all terms or conditions (including ordering, canceling, or restocking charges).**
 - b. **Owner may direct Contractor to cancel any one or more orders, in which case the Owner shall be liable for cancellation and restocking charges and other charges properly attributable to the cancellation: or**
 - c. **Owner may direct the Contractor to keep any one or more orders in effect and/or to assign any one or more orders to the Owner, in which case the Owner shall be responsible for bearing the costs of the order.**
 - d. **Within ten (10) days of the Owner's receiving the evidence described in Paragraph 16.03.A.2.a, the Owner shall give the Contractor notice of which options it exercises under Paragraphs 16.03.A.2.b or 16.03.A.2.c.**
 - 3. ~~other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.~~
The Owner shall pay the Contractor a termination fee of one hundred dollars (\$100.00) in addition to other amounts due pursuant to this Paragraph 16.03.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

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 seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 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, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph 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.

16.05 **Protection and Preservation of the Work**

- A. **Upon suspension (Paragraph 16.01), termination (Paragraphs 16.02, 16.03 and 16.04), or stopping Work (Paragraph 16.04):**
 - 1. **Contractor shall take actions necessary for the protection and preservation of the Work, and Site, including those actions required by the Contract, except to the extent otherwise directed by the Engineer; and**
 - 2. **Contractor shall erect and leave in place barricades, lights, and other safety devices as are appropriate for the protection of the public, including those devices required by the Contract, except to the extent otherwise directed by the Engineer.**
- B. **If the Contractor performs Work pursuant to directions given by the Engineer as described in Paragraph 16.05.A for the protection and preservation of the Work or of the public, Owner shall pay the Contractor for such protection and preservation of Work to the extent that it is greater than the Contractor would have done during or at the end of a workday had the Contract not been suspended or terminated or the Work stopped.**

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; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising 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; or~~
 - ~~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.~~
 4. **Any party allowed to use the dispute resolution process adopted by the State Building Commission pursuant to G.S. 143-135.26(11) and G.S. 143-128(F1) may participate in mediation pursuant to the dispute resolution process as a precondition to initiating litigation concerning the dispute. The amount of \$15,000 or more must be at issue before a party may require other parties to participate in the dispute resolution process. The costs of the dispute resolution process shall be divided between the parties to the dispute with at least one-third of the cost to be paid by the Owner, if Owner is a party to the dispute.**

ARTICLE 18 – MISCELLANEOUS

18.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered **by email**, in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.
- B. **If a party is notified of a replacement person for purpose of getting notice, then notices afterwards shall be directed to the replacement person. Written notices shall be deemed to have been duly served, made, and received, and receipt thereof completed, if:**
1. **delivered in person to the individual or to that individual's receptionist; or**
 2. **mailed by registered or certified mail to the last business address known to the party giving notice; or**
 3. **emailed to the last email address known to the party giving notice, provided that the email transmission must be completed.**
- C. **Written notices to the Owner must be directed to the Owner's representative, provided that if no individual is designated as the Owner's representative, then written notices must be directed to the Executive Director. As used in this Paragraph 18.01, the word 'notice' includes 'request'.**
- D. **The notice will be deemed served, made, and received, and receipt thereof completed, on the earlier of:**
1. **the date delivered in person: or**
 2. **three (3) days after placing in the custody of the U.S. Postal Service; or**

3. the date of the email transmission was completed.

- E. Address of Surety: Unless the surety provides a different address as provided in Paragraph 18.01, notice to a surety may be sent to the address shown on the performance bond; if no address for the surety's address provided by the N. C. Department of Insurance shall suffice; and if the Department of Insurance lacks an address, the last-known address of the attorney-in-fact who signed the performance bond shall suffice.

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.
- B. As used in the preceding sentence, a 'legal holiday by law of the appropriate jurisdiction' is a holiday observed by the Owner.

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 shall not constitute a waiver of that provision, nor shall 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 or completion of the Contract or termination 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 *Headings*

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

18.09 Effect on Other Rights

- A. The Contract Documents shall not be construed to create a cause of action against Owner and in favor of any person, firm, or corporation, other than Contractor. The Contract Documents shall not be construed to create a cause of action against Engineer and in favor of any person, firm or corporation, other than Owner. The Contract Documents are not intended to create a defense, except by Contractor, to any cause of action that may be brought by Owner. The recitation of duties, or limitations of duties, in the Contract Documents of Engineer or Engineer's consultants, representatives, and assistants, shall not be construed to reduce Owner's rights against Engineer, or to reduce Engineer's duties to Owner. No action or failure to act by Owner shall constitute a waiver of a right except to the extent specifically agreed in writing. If Owner waives a right, that waiver shall not imply other waivers of that right. If liquidated damages are assessable against the Contractor, Owner may, in its discretion, waive the imposition of some or all of the liquidated damages against the Contractor. That waiver shall be valid only if done by a writing signed by the Executive Director, and the waiver must refer specifically to 'liquidated damages'. That waiver shall not constitute an extension of the Contract Times.
- B. The agreement represents the entire and integrated agreement between the parties hereto and superseded prior negotiations and representations. Except as specifically otherwise provided, the Agreement is not intended to benefit, or to create a cause of action in favor of, any person, firm, or corporation, other than Owner and Contractor. Oral statements by anyone, including Owner's employees, agents, and Engineer, whether made before or after the execution of the Agreement, shall not be binding on Owner and shall not reduce Owner's rights under the Contract Documents.

18.10 Place of Project

- A. Choice of Law and Forum: The place of the Project is North Carolina. This Contract shall be deemed made in Carrboro, North Carolina. This Contract shall be governed by and construed in accordance with the laws of North Carolina. The exclusive forum and venue for all actions arising out of this Contract shall be the North Carolina General Court of Justice, in Orange County. Such actions shall neither be commenced in nor removed to federal court. This Paragraph shall not apply to subsequent actions to enforce a judgment entered in actions heard pursuant to this Paragraph.

END OF DOCUMENT

SECTION 01 10 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT

- A. The project consists of, but is not limited to, the following summary of work:

Complete and operable installation of approximately 4,634 linear feet of 8-inch restrained joint polywrapped ductile iron water pipeline from the intersection of Raleigh Road and Burning Tree Drive through the intersection of Burning Tree Drive and Pinehurst Drive..

Installation of approximately 831 linear feet of 2-inch SDR 17 PVC water main and 90 linear feet of 2-inch type "K" hard copper water main to be installed via open cut.

Installation of all temporary and new permanent water services and interconnections, required to install complete and operable water lines meeting local requirements and requirements as described in the contract documents.

Abandonment of approximately 5,470 linear feet of 8-inch AC water pipe by cellular concrete or grout fill.

Applicable traffic control, restoration, erosion and sediment control, permitting, and other items required to meet local requirements and requirements as described in the contract documents.

The foregoing description shall not be construed as a complete description of all work required.

1. Project Location: Town of Chapel Hill, Orange County, North Carolina
 2. Owner: Orange County Water and Sewer Authority
- B. Contract Documents were prepared for the Project by McKim & Creed, Inc., 4300 Edwards Mill Road, Suite 200, Raleigh, North Carolina 27612, (919) 233-8091.
 - B. The Work consists of furnishing all labor, materials, tools, equipment, and related items and services required for construction in strict accordance with the Contract Documents. All Bids shall include mobilization and demobilization, administration labor, materials, tools, equipment, transportation, taxes, insurance, and all other items necessary for a complete and acceptable project.
 - D. The Work will be constructed under a single prime contract with award based on the lowest responsive bid.

SECTION 01 10 00 – SUMMARY OF WORK

1.3 WORK UNDER OTHER CONTRACTS (Not Applicable)

1.4 FUTURE WORK (Not Applicable)

1.5 WORK SEQUENCE

- A. The Contractor shall ensure that all driveways are fully accessible for vehicular traffic at all times during progress of the Work. Contractor shall use the Traffic Management Plans included in the contract drawings and coordinate with the Town of Chapel Hill or NCDOT as applicable for traffic sequencing during project construction.
- B. Contractor shall construct project in such a way to minimize utility outage duration to OWASA customers.
- C. Contractor shall construct project using sequencing to minimize inconvenience to project area residents.

1.6 CONTRACTOR USE OF PREMISES

- A. Owner has obtained legal access to install sewer lines and associated appurtenances, and abandon existing water lines and appurtenances within the project area. The Contractor is responsible for confining activity within the legal access area (defined by the limits of disturbance). The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.
- B. The Contractor shall plan the construction activities around OWASA-observed holidays. The Contractor may be restricted from any work on special event days to ensure that there are no impacts to the traffic.
- C. Work is located primarily within Right-of-Ways of the Town of Chapel Hill and North Carolina Department of Transportation, Requirements of the owners of the right-of-ways must be complied with and specifically as required in the permits appended to the Project Manual.
- D. If additional staging areas are needed, Contractor is responsible for all costs including but not limited to acquisition, legal agreements, modifications to approved permits and approval from applicable agencies.

1.7 OCCUPANCY REQUIREMENTS (Not Applicable)

1.8 PRODUCTS ORDERED IN ADVANCE (Not Applicable)

1.9 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish the meters upon request by the Contractor.

1.10 MISCELLANEOUS PROVISIONS

- A. Provide property and tenant notifications in accordance with the General Conditions and the following:

SECTION 01 10 00 – SUMMARY OF WORK

1. Submit a draft of the proposed notice to OWASA for approval prior to distribution.
 2. Provide notice in both English and Spanish.
 3. Notify OWASA and the Town of Chapel Hill two (2) weeks prior to and 48 hours prior to the start of construction at specific locations.
- B. Notify property owners and tenants of the impending work and provide a period of time to remove personal property and improvements from the work area. OWASA will provide a representative responsible for addressing property owners' or tenants' on-site concerns.
- C. Notify property owners and tenants of potential impending road or parking area closures and temporary parking areas two (2) weeks and 48 hours prior to the start of construction. Provide a period of time when roads or parking areas will be closed each day and when the roads or parking areas will re-open each day. OWASA will provide a representative responsible for addressing property owners' or tenants' on-site concerns. One lane of traffic shall remain open at all times during construction.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 10 26 – UNIT AND LUMP SUM PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit and lump sum prices.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 14 00 "Quality Control" for general inspection requirements.
 - 2. Division 2 Section 02275 "Trenching, Backfilling and Compaction of Utilities" for Quality Control Field Density (Compaction) Testing requirements.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if the estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Lump sum is an amount proposed by bidders, stated on the Bid Form, as a price to include all materials, labor, etc. for work furnished and installed, complete and operational.

1.4 PROCEDURES

- A. The total Bid Price shall cover all Work required by the Contract Documents. All costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.
- B. Measurement and Payment: All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the Work and (b) for the purpose of comparing the bids submitted for the Work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The

basis of payment for work and materials will be the actual amount of work done and materials furnished. Contractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts thereof.

- C. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by the Engineer or Owner.
- D. Retainage: Refer to Document 00 52 15 – Agreement Form-Single Prime Contract
- E. Schedule: A "Unit and Lump Sum Price Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials described under each unit.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 BASE BID

A. UNIT PRICE SCHEDULE

- 1. DUCTILE IRON WATER LINE, PRESSURE CLASS 350, RESTRAINED JOINT
 - a) Measurement
 - (1) By the linear foot. All pipes shall be measured from the exact beginning of the pipe to the end of the line without deduction for fittings, bends and valves.
 - b) Payment
 - (1) The accepted quantities of water line pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified complete in place. This price shall include labor, equipment, materials, tools, trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, restraints, polywrap (where required) concrete thrust blocking (where required), pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, tracer wire, marking tape, cleaning and all other work incidental to the complete installation of the mains in accordance with these specifications. Fittings, valves, and specialty items are paid separately, as listed in the Bid. Piping used for making connections to existing water mains is not eligible for payment under this item.

2. SDR 17 PVC WATER MAIN

a) Measurement

- (1) By the linear foot. All pipes shall be measured from the exact beginning of the pipe to the end of the line without deduction for fittings, bends and valves.

b) Payment

- (1) The accepted quantities of water line pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified complete in place. This price shall include labor, equipment, materials, tools, trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, concrete thrust blocking, making connections to existing mains, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, cleaning, dewatering, tracer wire, marking tape, and all other work incidental to the complete installation of the mains in accordance with these specifications. Bends, fittings and transition couplings are to be included in the cost of the pipe, with no separate payment being made for these items.

3. TYPE "K" HARD COPPER WATER MAIN

a) Measurement

- (1) By the linear foot. All pipes shall be measured from the exact beginning of the pipe to the end of the line without deduction for fittings, bends and valves.

b) Payment

- (1) The accepted quantities of water line pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified complete in place. This price shall include labor, equipment, materials, tools, trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, concrete thrust blocking, making connections to existing mains, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, cleaning, dewatering, tracer wire, marking tape, and all other work incidental to the complete installation of the mains in accordance with these specifications. Bends, fittings and transition couplings are

to be included in the cost of the pipe, with no separate payment being made for these items

4. TESTING, SEEDING, AND RESTORATION

a) Measurement

- (1) Water line testing (including compaction testing outlined in the specification), seeding and site restoration shall be paid per linear foot of pipe installed. This Item shall be measured at the completion of work.

b) Payment

- (1) The price stated for this item is full compensation for all work and expense incidental thereto for the following items of Work under this Contract as specified or as shown on the Drawings and in the Bid, unless it is specifically provided for under other Items in the Bid. The unit price shall include full compensation for furnishing all labor, materials, coordination, tools, equipment and for all work and incidentals thereto for the completion of water line testing, flushing and sterilization, along with final seeding, fertilization, mulching, stabilization, compaction testing required by Owner as outlined in Section 02275 including all reporting, and restoration of all disturbed areas throughout the project site.

5. DUCTILE IRON RESTRAINED MECHANICAL JOINT FITTINGS INSTALLED ON NEW WATER MAINS

a) Measurement

- (1) The quantity to be paid for this Item is to be based on the compact fittings weights as published by the fitting manufacturer. The unit of measure is in pounds. Measurement of the number of pounds of fittings shall not include the follower ring, bolts, gaskets, glands or mechanical joint restraint.

b) Payment

- (1) The price stated for this Item shall be full compensation for all work and expense incidental thereto for furnishing all materials, labor, tools and equipment required for a complete installation of the restrained mechanical joint fittings in-place at the locations indicated on the Drawings and in accordance with the details shown on the drawings.
- (2) Cost of the restrained mechanical joint fitting is to include the cost of the fitting, all accessories, restraints,

glands, gaskets, hardware, concrete blocking, sleeves and couplings used to transition between new and existing pipe materials, new restrained joint ductile iron pipe required to connect the new fitting to an existing pipe. No separate payment will be made for these items. Cost to also include trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, dewatering, saw cutting of existing pipe, cleaning and disinfection, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, cleaning and all other work incidental to the complete installation.

- (3) Sleeves and couplings used to connect new piping based on the sequence of installation shall be included in the cost of the pipe. No separate payment will be made for sleeves or couplings which may be required for installation of the new ductile iron water main and fittings on the new water main.
- (4) Where a tee is installed on and/or connected to an existing water main and includes a blow off assembly, the tapped cap or plug and/or reducers required for the blow off assembly are to be included in the cost of the blow off assembly as herein specified. Where a tee is installed on and/or connected to an existing water main and includes a cap or plug without a blow off assembly, the cap or plug will be paid at the bid unit price for ductile iron restrained mechanical joint fittings installed on and/or connected to new water mains.

6. RESILIENT WEDGE GATE VALVE WITH VALVE BOX

a) Measurement

- (1) The quantity to be paid for gate valves will be measured by the actual number of each size and type of valve listed in the Bid, installed complete and in-place.

b) Payment

- (1) Gate valves will be paid for at the contract unit price, per valve for the type and size specified, complete in place. This price shall include all labor, equipment, and materials necessary for installation, including valve footing (if applicable), furnishing, backfilling, and all other work incidental to the complete installation of the valves, with necessary valve box, in accordance with the specifications. Cost for accessory kit to be included in price of valve, including all restraints.

- (2) The Bid unit price for 2" gate valves is to include required tapping saddle, brass nipple(s) and transition couplings required to adapt between differing pipe materials.
- 7. CONNECT TO EXISTING WATER MAIN VIA INSERTION VALVE RETAINED USING VALVE BRACE WITH VALVE BOX
 - a) Measurement
 - (1) The quantity to be paid for this Item is to be based on the actual number of connections to existing water line via insertion valves restrained using valve brace with valve box at the size and type specified in the Bid and included in the Drawings.
 - (2) The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all materials, labor, tools and equipment required for a completion connection to existing water line via insertion valve restrained using valve brace with valve box at the locations indicated on the Drawings and in accordance with the Details shown on the Drawings.
 - (3) Insertion valves will be paid for at the contract unit price, per valve for the type and size specified, complete in-place. The price shall include all labor, equipment, and materials necessary for installation of the insertion valve, including excavation, shoring, testing, backfill, compaction, concrete valve footing (per valve manufacturer's recommendation for installation on AC or CI pipe), concrete restraint thrust collar, rodding, restraint, steel reinforcement, valve insertion on existing water mains, backfilling, compaction and all other work incidental to the complete installation of the insertion valves, with the necessary valve box, in accordance with the specifications.
- 8. CONNECT TO EXISTING WATER LINE VIA CUT-IN GATE VALVE WITH VALVE BOX
 - a) Measurement
 - (1) The quantity to be paid for this Item is to be based on the actual number of connections to existing water line via cut-in gate valves with valve box at the size and type specified in the Bid and included in the Drawings.
 - b) Payment
 - (1) The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all

materials, labor, tools and equipment required for a completion connection to existing water line via a cut-in gate valve at the locations indicated on the Drawings and in accordance with the Details shown on the Drawings.

- (2) Cost of the connection to existing water line via proposed cut-in gate valve with valve box is to include the cost of pipe, valve, restraints, glands, gaskets, hardware, rodding, concrete blocking/collar, steel reinforcement, sleeves and couplings used to transition between new and existing pipe materials, and new restrained joint ductile iron pipe required to connect existing water line to a new cut-in gate valve. No separate payment will be made for these items. Cost to also include trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, dewatering, saw cutting of existing pipe, cleaning and disinfection, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, cleaning and all other work incidental to the complete installation.

9. PERMANENT BLOWOFF ASSEMBLY

a) Measurement

- (1) The quantity to be paid for this Item is to be based on the actual number of each blow off assembly installed.

b) Payment

- (1) The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all materials (including pipe, valve, reducer, plugs or caps, restraints, blocking, bedding, valve box and incidentals), labor, tools and equipment required for a complete and acceptable blow off indicated on the drawings and Bid Sheet and in accordance with the details shown in the Drawings. The price stated is to also include excavation, backfilling, testing, chlorinating, and bacteriological testing. Payment will be at the unit price per blow off and assembly of the size stated, complete in-place.

10. FIRE HYDRANT ASSEMBLY

a) Measurement

- (1) The quantity to be paid for fire hydrant assemblies will be measured by the actual number of new fire hydrant

assemblies installed, complete and in-place

b) Payment

- (1) Price shall include all labor, equipment, and all materials (including vertical extensions, fittings, tees, piping, restraints and valves) necessary to install the hydrant including construction staking, #57 stone, concrete blocking, painting, testing, and disinfecting, complete and in place. No additional compensation will be made regardless of whether the hydrant is a high or low pressure hydrant. The cost of surveying for staking hydrant location is to be included in the cost of the hydrant unless an item is provided in the proposal for utility construction staking whereupon the costs shall then be included in that line item.
- (2) No separate payment will be made for the main line tee or hydrant guard valve installed as part of the complete fire hydrant assembly. No separate payment will be made for vertical barrel extensions.

11. AIR RELEASE VALVE IN MANHOLE

a) Measurement

- (1) The quantity to be paid for air release valves will be measured by the actual number of each size and type of air release valve and associated manhole as listed in the Bid and shown in the Details, installed complete and in-place.

b) Payment

- (1) Air release valves will be paid for at the contract unit price, per valve for the type and size specified, complete in-place. The price shall include all labor, equipment, and materials necessary for installation of the air release valve and manhole, including furnishing, backfilling, pipe tapping saddle and tap, mainline tee or tapping saddle (as specified), bedding materials, manhole, and pipe fittings, isolation valves and/or corporation stops, air release valve, miscellaneous pipe nipples, spool pieces and fittings, manhole ring and cover, and all other work incidental to the complete installation of the complete air release valve assembly.

12. NEW WATER SERVICE, METER SETTER AND METER BOX (COMPLETE)

a) Measurement

- (1) The quantity to be paid for this Item is to be based on the actual number of each size service and meter assembly installed.

b) Payment

- (1) The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all materials (including the tapping saddles, valve or corporation stop, header piping, meter setter, angle valves, check valves, blowoffs for gang services, meter, meter box, pipe, fittings and incidentals), labor, tools if applicable, and equipment required for a complete and acceptable meter box and assembly of the size, design, and orientation indicated on the drawings and Bid Sheet and in accordance with the details shown on the Drawings. Price stated also includes trenchless installation of service piping for new far side services and connection to proposed water main. Restoration of all disturbed areas to match existing is to be included in the bid unit price, unless specific restoration bid items are included in the bid. The price stated is to also include excavation, backfilling, testing, chlorinating, and bacteriological testing. If meter box does not require tying into existing service, pipe shall be plugged for future extension by others. Payment will be at the unit price per meter box and assembly of the size stated, complete in-place. If replacing an existing meter box, cost shall include removal and disposal of the old meter box and assembly, in addition to connecting the existing water service piping to the new meter box and transferring the existing meter from the existing meter setter to the new meter setter.
- (2) Trenchless methods for service pipe installation shall be used for far-side services when possible, and payment will include excavation, backfilling and compacting, service pipe from main to right-of-way or location indicated on the drawings, direct bore under road, tap to main and all service components listed previously for complete installation of new service without excavation of roadway. Contractor shall be granted three (3) attempts to install service using trenchless methods. If unsuccessful after these attempts, Contractor will be able to open cut service pipe only if trenchless installation method failure is through no fault of the Contractor. Asphalt restoration required for open cut under this condition will be paid under Contract Unit Prices.

13. REMOVE EXISTING FIRE HYDRANT

a) Measurement

- (1) Removal of existing fire hydrants shall be paid at the actual number of fire hydrants to be removed and shall be full compensation for performing all items of work within the payment limits identified on the Drawings.

b) Payment

- (1) Removing existing fire hydrants shall be paid for at the unit price for each set forth in the Bid Form and shall include all necessary work including excavation, abandonment, plugging existing hydrant tee, removal of existing concrete blocking, removal of existing hydrant valve, and any other work necessary. Hydrant assembly shall be returned to the Orange Water and Sewer Authority (OWASA).

14. ABANDON EXISTING WATERLINE BY GROUT FILL

a) Measurement

- (1) The quantity to be paid for under this Item is the actual number of linear feet of existing water main of the size listed in the Bid which is abandoned by grout filling.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material, all labor, tools, and equipment for complete and acceptable grout filling within the limits indicated on the Drawings, to include temporary connections and grout ports as required for complete abandonment of the existing water main to the extents listed on the drawings. Cost of abandoning existing valves that fall within the limits of the existing water line being grout filled is to be included in this cost of this item, with no separate payment being made for abandonment of existing valves on existing water lines which are being grout filled.

15. CUT AND CAP EXISTING WATER MAIN

a) Measurement

- (1) The quantity to be paid for this Item is to be based on the actual number of each cut and cap abandonment installed on existing water mains, of the size and type as listed in the Bid, complete and in-place.

b) Payment

- (1) The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all materials (including pipe, couplings, adapters, sleeves, caps/plugs, concrete, braces, restraints and incidentals), labor, tools and equipment required for a complete and acceptable cut and cap abandonment indicated on the drawings and Bid and in accordance with the details shown in the Drawings. The price stated is to also include excavation, backfilling, abandonment.

16. ABANDON EXISTING VALVE BOX IN-PLACE

a) Measurement

- (1) Abandonment of existing valve boxes shall be paid at the actual number of valve box abandoned in-place and shall be full compensation for performing all items of work within the payment limits identified on the Drawings.

b) Payment

- (1) The price stated for this item is full compensation for all work and expense incidental thereto for abandonment of existing valve boxes as specified or as shown in the Drawings and in the Bid, unless it is specifically provided for under other Items in the Bid. The bid unit price shall include compensation for furnishing all labor, materials coordination, tools, equipment and for all work and incidentals thereto for the abandonment of existing valve boxes on existing water mains as indicated on the Drawings and/or required as part of the work, and in accordance with the details shown on the Drawings. Restoration of all disturbed areas to match existing is to be included in the bid unit price unless a separate bid items is provided for the type of restoration required.

17. REMOVE EXISTING WATERLINE

a) Measurement

- (1) The quantity to be paid for under this Item is the actual number of linear feet of existing water main of the size listed in the Bid which is removed.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material, all labor, tools, and equipment for complete and acceptable removal of existing water line within the limits indicated on the Drawings, to include removal of existing pipe, backfilling with appropriate material, compaction, removal of existing appurtenances, and disposal, hauling, and other items necessary to complete the work.

18. REMOVE AND REPLACE STORM DRAIN CROSSINGS AS NEEDED FOR CONSTRUCTION

a) Measurement

- (1) The quantity to be paid for under this Item is the actual number of linear feet of storm drain to be removed and replaced as needed for construction per the diameter, material, and dimensions as shown in the Drawings.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material (including excavation, disposal, bedding, materials, traffic control, compaction, dewatering, and bypass pumping) for a complete replacement of existing storm drain as needed for construction complete in-place.

19. REMOVE AND REPLACE CONCRETE CURB & GUTTER

a) Measurement

- (1) The quantity to be paid for under this Item is the actual number of linear feet of concrete curb and gutter cut, removed, and restored to match existing curb and gutter from publicly maintained roadways or private roadways as required to install the new piping within payment limits identified on the Drawings and as shown in the Details. This item shall be measured at completion of work.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material (including concrete cutting, excavation, removal and disposal; placement and compaction of sub-base materials and concrete to the thickness defined on the Drawings or to match existing concrete thickness (whichever is greater); all labor, tools, and equipment for complete and acceptable concrete curb and gutter cutting,

removal, and restoration within the limits indicated on the Drawings. Any concrete curb and gutter damaged as a result of the Contractors actions, which is outside of the designated payment limits, shall be repaired at the Contractors expense.

20. REMOVE AND REPLACE TOWN OF CHAPEL HILL ASPHALT ROADWAY/TRENCH REPAIR (6" CABC + 5" I19.0B + 1" SF9.5A)

a) Measurement

- (1) The quantity to be paid for this Item is the number of square yards of asphalt roadway cut, removed, and restored to match existing asphalt roadway as required to install the new piping within payment limits identified on the drawings. This item shall be measured at completion of work.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material (including asphalt cutting, excavation, removal and disposal; placement and compaction of sub-base materials and asphalt to the thickness defined on the Drawings or to match existing asphalt thickness (whichever is greater); all labor, tools, and equipment for complete and acceptable asphalt cutting, removal, and restoration within the limits indicated on the Drawings. The price listed it to also include restoration of any and all asphalt pavement features, including but not limited to striping, markings, reflectors, and signage, disturbed or damaged during construction. Contractor shall conform to applicable Town of Chapel Hill roadway standards. Any asphalt roadway surfaces damaged as a result of the Contractors actions, which is outside of the designated pavement limits, shall be repaired at the Contractors expense. No additional payment will be made for material price differences between the time of bid and the time the work is installed.
- (2) Payment will only be made for the initial installation of the permanent asphalt paving section. No separate payment will be made for temporary asphalt paving or cold patch asphalt. Payment will only be made for the initial installation of permanent asphalt paving which meets the requirements of the Contract Documents; payment will not be made for areas where permanent asphalt paving is removed and replaced beyond the initial installation due to the sequence of the work as necessitated.

21. REMOVE AND REPLACE SPEED HUMP

a) Measurement

- (1) The quantity to be paid for under this Item is the actual number of each of speed hump, removed, and replaced to match existing asphaltic concrete as required to install the new piping within payment limits identified on the drawings. This item shall be measured at completion of work.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for furnishing all material (including concrete cutting, excavation, removal and disposal; placement and compaction of sub-base materials and concrete to the thickness defined on the Drawings or to match existing concrete material); all labor, tools, and equipment for complete and acceptable concrete speed hump cutting, removal, and restoration within the limits indicated on the Drawings. Any concrete speed hump damaged as a result of the Contractors actions, which is outside of the designated payment limits, shall be repaired at the Contractors expense.

22. UNDERCUT EXCAVATION AND DISPOSAL OF UNSUITABLE MATERIAL

a) Measurement

- (1) The quantity to be paid for under this item is the number of cubic yards of undercut material, which has been excavated and removed below the proposed trench bottom and replaced with #57 washed stone (compacted in-place). The quantity shall be calculated by measuring the actual quantity removed from the trench, with no consideration given for shrinkage or swelling.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for the excavation, removal, trucking, and disposal of undercut trench material and the cost of replacement with #57 washed stone, compacted in-place. This item shall include the cost of all material, labor and equipment required for removal and replacement of undercut trench material. In order to be paid under this Item, the Engineer or Owner must identify the material as unsuitable. Areas which require pipe bedding with #57 washed stone (see details on the drawings) are not eligible for payment under this item.

Rock removal and replacement is not eligible for payment under this item. Trench bottom requirement stabilization stone due to negligence on the contractor to maintain adequate dewatering operations will not be considered for payment.

23. REMOVE UNSUITABLE EXCAVATED MATERIAL AND REPLACE WITH SELECT BACKFILL

a) Measurement

- (1) The quantity to be paid for under this item is the number of cubic yards of unsuitable material from the trench prior to installation of pipe lines and replacement with select pipe bedding and backfill material. The basis for measurement shall be the in-place volume as determined by the Engineer prior to removal not to exceed the trench width and trench depth as established in Section 02275.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for excavation, removal, trucking, and disposal of unsuitable waste material off-site. This item shall include the cost of all material, labor, tools and equipment required for removal and replacement of unsuitable trench material. In order to be paid under this Item, the Engineer or Owner must identify the material as unsuitable. For measurement purposes, the width of unsuitable material shall be measured as 4' max. Over excavation will not be considered for additional payment.

24. SEPARATION/PROTECTION EXCAVATABLE FLOWABLE FILL

a) Measurement

- (1) The quantity to be paid for under this Item is the number of cubic yards of concrete used for separation/protection excavatable flowable fill to support or protect existing utilities where minimum separations cannot be maintained due to field conditions as approved by the Owner's Representative in the field.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for the excavation, form work and setting of the separation/protection excavatable flowable fill. This item shall include the cost of all material, labor, tools and equipment required for installation of the separation/protection concrete.

25. STRAW WATTLE INLET PROTECTION DEVICES

a) Measurement

- (1) The quantity to be paid for under this item is the number of the straw wattle inlet protection devices installed and in-place as specified on the Drawings.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for the complete installation of the inlet protections at the locations indicated on the Drawings or as specified by the Engineer. The unit price stated includes materials; labor, tools and equipment to make a complete installation, maintain during construction, and to remove the inlet protections upon project completion.

B. LUMP SUM PRICE SCHEDULE

1. MOBILIZATION AND DEMOBILIZATION

a) Measurement

- (1) Mobilization and demobilization work shall be bid on a lump sum basis in the Bid and shall be full compensation for preparing and performing the Items of work under this Contract as specified or as shown on the Drawings, unless it is specifically provided for under other Items in the Bid. The lump sum price shall include full compensation for: general provisions of the contract, bonds, insurance, not included as part of other Items, mobilization, demobilization, general supervision, project signage and all other costs associated with the project which are not specifically paid under other pay items.

b) Payment

- (1) The lump sum price stated for this Item in the Bid is full compensation for furnishing all labor, materials, tools and equipment and for all work and expense incidental thereto for mobilization and demobilization; and for all other

miscellaneous work and costs associated with the project which are not specifically paid under other pay items.

- (2) The lump sum amount listed for mobilization shall not exceed 3% of the cost of all other items listed in each section of the Bid. Payment for mobilization shall be made in two equal payments, with the initial 50% being paid upon initial mobilization and starting work at a particular site, with the final 50% being paid upon completion of work and complete demobilization from a particular site.

2. TRAFFIC AND PEDESTRIAN CONTROL

a) Measurement

- (1) Traffic and pedestrian control shall be paid on a lump sum basis and shall include all labor, equipment, signs, cones, barriers, materials, and associated effort incidental to establishing and performing traffic control work in connection with the project as required by the Drawings, specifications, Town, NCDOT or other regulatory agencies.

b) Payment

- (1) The price stated for this Item is full compensation for all work and expense incidental thereto for traffic control associated with the project. Periodic payments for traffic control will be made based on the progression of the Work.

C. ALLOWANCES

1. TOWN OF CHAPEL HILL ENGINEERING FEE ALLOWANCE

- a) The Town of Chapel Hill Engineering Division may require the payment of the following fees:
 - (1) Street Construction/Improvements
 - (2) Sidewalks/Trails/Paths/Fire Lanes
 - (3) Water Lines within the Public Right-of-Way
 - (4) Inspection of Traffic Control Devices and Methods

This allowance shall not be used unless deemed necessary by OWASA following negotiations with the Town of Chapel Hill. Copies of invoices for the engineering fees listed above from the Town of Chapel Hill shall be

submitted with monthly pay requests. The Contractor will be paid for actual fees incurred, only; plus 10% markup for coordination efforts.

- (1) The Town of Chapel Hill Public Works Streets Division may require payment of street cut fees on Town maintained roadways. Fees may be waived subject to the Town's discretion. This allowance shall not be used unless deemed necessary by OWASA following negotiations with the Town of Chapel Hill. Copies of invoices for any street cut fees incurred by the Town of Chapel Hill shall be submitted with monthly pay requests. The Contractor will be paid for actual fees incurred, only.

2. CONTINGENCY ALLOWANCE

- a) A contingency allowance has been included as specified in the Bid. This allowance shall not be used unless deemed necessary by OWASA, and authorized in writing by the Engineer or Owner. The contingency allowance is not due the Contractor in the whole or part without written authorization by a work change directive or change order issued by the Engineer or Owner and executed by the Owner.
- b) Items eligible for payment through the listed contingency allowance will be authorized by the Engineer or Owner via work change directive. Contractor will be requested to provide written proposal for the work required, which shall include all necessary documentation to support the costs listed in Contractor's proposal, including a breakdown of all labor, equipment and materials, along with invoices, proposal or quotes from subcontractors and suppliers.

END OF SECTION 01 10 26

SECTION 01 10 60 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements and procedures for obtaining permits and complying with permits.

1.2 PERMITS

- A. Obtain Local, County, State, and Federal permits not obtained by Owner, which may include but may not be limited to the following:
 - 1. Town and Permits
 - 2. Revision and “As-Built” Plan Review
 - 3. Inspection
 - 4. Reinspection
- B. Owner will obtain the following permits if necessary:
 - 1. North Carolina Department of Environmental Quality Public Water Supply Engineering Plans Approval and Authorization to Construct;
 - 2. North Carolina Department of Environmental Quality Fast Track Sewer Permit
 - 3. North Carolina Department of Transportation Encroachment Agreement
 - 4. Town of Chapel Hill Construction Permit and Zoning Compliance Permit
 - 5. North Carolina Department of Environment Quality Division of Water Infrastructure Authorization to Award
- C. Documents:
 - 1. Owner will furnish signed and sealed sets of Contract Documents for permit applications.
 - 2. Owner will furnish copies of permits obtained by Owner and required to be posted on the job site. Copies of permits will be forwarded to Contractor prior to start of construction.
 - 3. Contractor shall furnish copies of permits obtained by the Contractor. Forward copies of permits to the Engineer and Owner prior to commencement of work requiring permits.
 - 4. Contractor shall give all notices and comply with all environmental permits and regulations applicable to furnishing and performance of the Work notwithstanding the fact that the Contractor may not be a permittee or co-

permittee with respect to some or all of such environmental permits. If the Contractor's work exceeds the anticipated limits and requires additional permits, the Contractor shall obtain such permits at no additional cost to the Owner, or pay all costs incurred by the Owner in obtaining such permits.

1.3 CODES

- A. Codes applicable to this project include, but are not necessarily limited to, the latest editions of the following:
 - 1. Standard Building Codes
 - 2. Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto
 - 3. Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto
 - 4. Accessibility Requirements Manual, North Carolina Board of Building Codes and Standards
 - 5. The Americans with Disabilities Act (ADA) 1990 36 CFR Part 1191 Architectural and Transportation Barriers Compliance Requirements
 - 6. NFPA 101 Life Safety Code, Latest Edition
 - 7. Standard Fire Prevention Code, Latest Edition
 - 8. State Fire Marshal's Uniform Fire Safety Rules
- B. If there is a conflict in regulations, codes, or regulations and codes, the more stringent requirements shall govern.

1.4 FEES

- A. Contractor will pay the costs for permit fees and inspections. No separate compensation will be allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 VERIFICATION AND CONFORMANCE

- A. Verify that all permits, which Owner is required to obtain, have been obtained. Copies of these permits will be made available to the Contractor at office of Engineer and Owner.

- B. Obtain all permits Contractor is responsible for obtaining and submit three (3) copies of each to Engineer and Owner.
- C. Conform to all requirements of each permit.

END OF SECTION 01 10 60

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS:

- A. General: Basic contract definitions are included in the Conditions of the Contract.
- B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Engineer or Owner, requested by the Engineer or Owner, and similar phrases.
- D. "Approved": The term "approved," when used in conjunction with the Owner or Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Owner or Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, who performs a particular construction activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
 3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
- J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
- 1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION:
- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 50-division format and "MasterFormat" numbering system.
 - B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpolated as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

1.4 INDUSTRY STANDARDS:

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the Owner or Engineer before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

- 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Owner or Engineer for a decision before proceeding.

- D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

- 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following abbreviations and acronyms, as referenced in the Contract Documents, mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

AA Aluminum Association, Inc.
900 19th Street, NW, Suite 300
Washington, DC 20006 (202) 862-5100

AASHTO American Association of State Highway and Transportation
Officials
444 North Capitol Street, Suite 249
Washington, DC 20001 (202) 624-5800

ACI American Concrete Institute
P.O. Box 19150
Detroit, MI 48219 (313) 532-2600

ACIL American Council of Independent Laboratories

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

	1629 K Street, NW Washington, DC 20006	(202) 887-5872
ACPA	American Concrete Pipe Association 8300 Boone Boulevard, Suite 400 Vienna, VA 22182	(703) 821-1990
AI	Asphalt Institute Research Park Drive P.O. Box 14052 Lexington, KY 40512-4052	(606) 288-4960
AIA	American Insurance Association 1130 Connecticut Avenue, NW, Suite 1000 Washington, DC 20036	(202) 828-7100
ASC	Adhesive and Sealant Council 1627 K Street, NW, Suite 1000 Washington, DC 20006-1707	(202) 452-1500
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017-2398	(800) 548-2723
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017	(212) 705-7722
ASSE	American Society of Sanitary Engineering 901 Canterbury Road, Suite A Westlake, OH 44145	(440) 835-3040
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428	(610) 832-9585
AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, CO 80235	(303) 794-7711
CISPI	Cast Iron Soil Pipe Institute 5959 Shallowford Road, Suite 419 Chattanooga, TN 37421	(615) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute 1776 Massachusetts Avenue, NW, Suite 500 Washington, DC 20036	(202) 659-3537
DIPRA	Ductile Iron Pipe Research Association 245 Riverchase Parkway East	

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

	Birmingham, AL 35124	(205) 988-9870
HI	Hydraulic Institute 9 Sylvan Way Parsippany, NJ 07054-3802	(201) 267-9700
HI	Hydronics Institute P.O. Box 218 35 Russo Place Berkeley Heights, NJ 07922	(908) 464-8200
ILI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421	(812) 275-4426
IMSA	International Municipal Signal Association 165 E. Union Street Newark, NY 14513	(315) 331-2182
IRI	Industrial Risk Insurers P.O. Box 5010 85 Woodland Street Hartford, CT 06102-5010	(203) 520-7300
MIA	Marble Institute of America 30 Eden Alley, Suite 201 Columbus, OH 43215	(614) 228-6194
MIA	Masonry Institute of America 2550 Beverly Boulevard Los Angeles, CA 90057 Metal Lath/Steel Framing Association	(213) 388-0472
ML/SFA	(A Division of the NAAMM) 11 South LaSalle Street, Suite 1400 Chicago, IL 60603	(312) 201-0101
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602	(703) 281-6613
NAA	National Arborist Association The Meeting Place Mall Route 101, P.O. Box 1094 Amherst, NH 03031-1094	(603) 673-3311
NEC	National Electrical Code (Available from NFPA)	
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100	

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

	Bethesda, MD 20814-5372	(301) 657-3110
NPCA	National Paint and Coatings Association 1500 Rhode Island Avenue, NW Washington, DC 20005	(202) 462-6272
NSF	NSF International (Formerly National Sanitation Foundation) 3475 Plymouth Road P.O. Box 130140 Ann Arbor, MI 48113-0140	(313) 769-8010
PATMI	Power Actuated Tool Manufacturers' Institute, Inc. 1603 Boonslick Road St. Charles, MO 63301	(314) 947-6610
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083	(708) 966-6200
PCI	Precast/Prestressed Concrete Institute 175 W. Jackson Boulevard Chicago, IL 60604	(312) 786-0300
PDI	Plumbing and Drainage Institute c/o Sol Baker 1106 W. 77th Street, South Drive Indianapolis, IN 46260	(317) 251-6970
PEI	Porcelain Enamel Institute 102 Woodmont Center, Suite 360 Nashville, TN 37205	(615) 385-0758
PIMA	Polyisocyanurate Insulation Manufacturers Association 1001 Pennsylvania Avenue, NW 5th Floor North Washington, DC 20004	(202) 624-2709
RFCI	Resilient Floor Covering Institute 401 East Jefferson Street, Suite 102 Rockville, MD 20850	(301) 340-8580
RIS	Redwood Inspection Service 405 Enfrente Drive, Suite 200 Novato, CA 94949	(415) 382-0662
RMA	Rubber Manufacturers Association 1400 K Street, NW Washington, DC 20005	(202) 682-4800
SAE	SAE International	

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

	400 Commonwealth Drive Warrendale, PA 15096-0001	(412) 776-4841
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021	(847) 889-0010
SDI	Steel Door Institute 30200 Detroit Road Cleveland, OH 44145-1967	(216) 889-0010
SEFA	Scientific Equipment and Furniture Association 1028 Duchess Drive McLean, VA 22102	(703) 790-8661
SGCC	Safety Glazing Certification Council c/o ETL Testing Laboratories U.S. Route 11, Industrial Park P.O. Box 2040 Cortland, NY 13045	(607) 753-6711
SHLMA	Southern Hardwood Lumber Manufacturers Association (Now HMA)	
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Avenue Chicago, IL 60611	(312) 644-6610
SJI	Steel Joist Institute 1205 48th Avenue North, Suite A Myrtle Beach, SC 29577-5424	(843) 449-0487
SMA	Screen Manufacturers Association 2850 South Ocean Boulevard, #114 Palm Beach, FL 33480-6205	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive P.O. Box 221230 Chantilly, VA 22022-1230	(703) 803-2980
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504-9094	(904) 434-2611
SPRI	SPRI (Formerly Single Ply Roofing Institute) 175 Highland Avenue Needham, MA 02194	(617) 444-0242

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

SSIUS	Specialty Steel Industry of the United States 3050 K Street, NW Washington, DC 20007	(202) 342-8630
SSPC	Steel Structures Painting Council 4516 Henry Street, Suite 407 Pittsburgh, PA 15213	(412) 687-1113
SSPMA	Sump and Sewage Pump Manufacturers Association P.O. Box 647 Northbrook, IL 60065-0647	(708) 559-9233
STI	Steel Tank Institute 570 Oakwood Road Lake Zurich, IL 60047	(708) 438-8265
SWI	Steel Window Institute c/o Thomas Associates, Inc. 1300 Sumner Avenue Cleveland, OH 44115-2851	(216) 241-7333
SWPA	Submersible Wastewater Pump Association 1806 Johns Drive Glenview, IL 60025-1657	(847) 729-7972
TCA	Tile Council of America, Inc. 100 Clemson Research Boulevard Anderson, SC 29625	(864) 646-8453
TIMA	Thermal Insulation Manufacturers Association (Now NAIMA)	
TPI	Truss Plate Institute 583 D'Onofrio Drive, Suite 200 Madison, WI 53719	(608) 833-5900
TPI	Turfgrass Producers International (Formerly American Sod Producers Association) 1855-A Hicks Road Rolling Meadows, IL 60008	(800) 405-8873
UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062-2096	(708) 272-8800
UNI	Uni-Bel PVC Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234	(214) 243-3902
USP	U.S. Pharmacopeia (Formerly U.S. Pharmacopoeial Convention)	

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

	12601 Twinbrook Parkway Rockville, MD 20852	(301) 881-0666
WA	Wallcoverings Association 401 N. Michigan Avenue Chicago, IL 60611-4267	(312) 644-6610
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281	(503) 639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue, 17th Floor New York, NY 10017	(212) 661-4261
WIC	Woodwork Institute of California 3164 Industrial Boulevard 95891 P.O. Box 980247 West Sacramento, CA 95798-0247	(916) 372-9943
WMMPA	Wood Moulding and Millwork Producers Association P.O. Box 25278 Portland, OR 97225	(503) 292-9288
WRI	Wire Reinforcement Institute 1101 Connecticut Avenue NW, Suite 700 Washington, DC 20036-4303	(202) 429-5125
WSC	Water Systems Council Building C, Suite 20 800 Roosevelt Road Glen Ellyn, IL 60137	(708) 545-1762
WSFI	Wood and Synthetic Flooring Institute (Now MFMA)	
WWCA	Western Wall and Ceiling Association (Formerly Western Lath, Plaster, Drywall Industries Association) 7571 Mission Gorge Road San Diego, CA 92120	(619) 229-8307
WWPA	Western Wood Products Association Yeon Building 522 SW 5th Avenue Portland, OR 97204-2122	(503) 224-3930
WWPA	Woven Wire Products Association 4940 Elmgate Drive Orchard Lake, MI 48324	(810) 681-1055

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

- G. Federal Government Agencies: Names and titles of Federal Government standards- or specification-producing agencies are often abbreviated. The following abbreviations and acronyms referenced in the Contract Documents indicate names of standards- or specification-producing agencies of the Federal Government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.
- CE Corps of Engineers
(U.S. Department of the Army)
Chief of Engineers
General Information Referral
20 Massachusetts Avenue, NW
Washington, DC 20314 (202) 761-0660
- CFR Code of Federal Regulations
(Available from the Government Printing Office)
732 N. Capitol Street, NW
Washington, DC 20401 (202) 512-0000
(Material is usually published first in the "Federal Register.")
- CPSC Consumer Product Safety Commission
East West Towers
4330 East-West Hwy
Bethesda, MD 20814 (800) 638-2772
- CS Commercial Standard
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 512-0000
- DOC Department of Commerce
14th Street and Constitution Avenue, NW
Washington, DC 20230 (202) 482-2000
- DOT Department of Transportation
400 Seventh Street, SW
Washington, DC 20590 (202) 366-4000
- EDA Economic Development Administration - Regional Office
300 Fayetteville Street Mall
Raleigh, NC 27601 (919) 856-4570
- EPA Environmental Protection Agency
401 M Street, SW
Washington, DC 20460 (202) 260-2090
- FAA Federal Aviation Administration
(U.S. Department of Transportation)
800 Independence Avenue, SW
Washington, DC 20591 (202) 366-4000

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

FCC	Federal Communications Commission 445 12 th Street, SW Washington, DC 20554	(888) 225-5322
FDA	Food and Drug Administration 5600 Fishers Lane Rockville, MD 20857	(301) 443-1544
FHA	Federal Housing Administration (U.S. Department of Housing and Urban Development) 451 Seventh Street, SW Washington, DC 20410	(202) 708-1112
FS	Federal Specification Unit (Available from GSA) 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407	(202) 755-0325
GSA	General Services Administration 18 th and F Streets, NW Washington, DC 20405	(202) 708-5082
MIL	Military Standardization Documents (U.S. Department of Defense) Defense Printing Service 700 Robbins Avenue, Building 4D Philadelphia, PA 19111	(215) 697-2179
NIST	National Institute of Standards and Technology (U.S. Department of Commerce) Building 101, #A1134 Rte. I-270 and Quince Orchard Road Gaithersburg, MD 20899	(301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) 200 Constitution Avenue, NW Washington, DC 20210	(202) 219-5000
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 512-0000
RUS	Rural Utilities Service (Formerly Rural Electrification Administration) (U.S. Department of Agriculture) 14th Street and Independence Avenue, SW Washington, DC 20250	(202) 720-9560

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

USDA	U.S. Department of Agriculture 14th Street and Independence Avenue, SW Washington, DC 20250	(202) 720-8732
USDA	USDA Rural Development 4405 Bland Road, Suite 260 Raleigh, NC 27609	(919) 873-2054
USPS	U.S. Postal Service 475 L'Enfant Plaza, SW Washington, DC 20260-0010	(202) 268-2000
H.	State Government Agencies: The following state government agency produces standards referenced in the Contract Documents:	
NCDOT	NC Department of Transportation Division 7, District 1 District Engineer, District Office P.O. Box 766 115 East Crescent Square Drive Graham, NC 27253	(336) 570-6833
Construction Grants	Division of Water Infrastructure NCDEQ 1633 Mail Service Center Raleigh, NC 27699-1633	(919) 707-9160
Water Quality Section	Division of Water Resources NCDEQ Raleigh Regional Office 3800 Barrett Drive Raleigh, NC 27609	(919) 791-4200
Land Quality Section	Division of Energy, Mineral, and Land Resources NCDEQ Raleigh Regional Office 3800 Barrett Drive Raleigh, NC 27609	(919) 791-4200
Public Water Supply Section	Division of Water Resources NCDEQ Raleigh Regional Office 3800 Barrett Drive Raleigh, NC 27609	(919) 791-4200
Town of Chapel Hill	Town of Chapel Hill Public Works Department 6850 Millhouse Road Chapel Hill, NC 27516	(919) 969-5100

1.5 GOVERNING REGULATIONS AND AUTHORITIES: (Not Applicable)

SECTION 01 10 95 – REFERENCE STANDARDS AND DEFINITIONS

1.6 SUBMITTALS:

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 10 95

SECTION 01 12 00 – PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
 - 1. Preconstruction conference
 - 2. Progress meetings
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 13 00 "Submittals" for submitting the Contractor's Construction Schedule.

1.3 PRECONSTRUCTION CONFERENCE

- A. Owner and Engineer will schedule a preconstruction conference with the Contractor before starting construction, at a time convenient to the Owner and the Engineer. The conference will be held at the Project Site or another convenient location. The meeting will be conducted to review responsibilities and personnel assignments.
- B. Attendees: Authorized representatives of the Owner, Engineer, and their consultants; authorized representatives from Town of Chapel Hill; State and Local agencies; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties as applicable shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

1.4 PREINSTALLATION CONFERENCES (Not Applicable)

1.5 PROGRESS MEETINGS

- A. Conduct monthly progress meetings at the Project Site, virtually or another convenient location. The Engineer or Owner shall set dates and times and coordinate the progress meeting.
- B. Attendees: In addition to representatives of the Owner and the Engineer, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. Authorized representatives from the Town of Chapel Hill may also be in attendance at Progress Meetings. All participants at

SECTION 01 12 00 – PROJECT MEETINGS

the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present.
- D. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. The Contractor shall reissue the revised construction schedule as required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 12 00

SECTION 01 12 30 - ALTERNATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements for Alternates.

1.2 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all Work:
 - 1. Division 01, Section 01 10 26 "Unit and Lump Sum Prices".

1.3 DEFINITIONS

- A. Alternate: An Alternate is an item of work that the Owner is requesting separate bids for as indicated on the Bid Form and defined in the Contract Documents. The Alternates may be "Added To" or "Deducted From" the Base Bid as indicated on the Bid Form.

1.4 QUALITY ASSURANCE

- A. Coordinate related Work and modify adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.
- B. A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements described under each Alternate.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to and required for a complete installation as part of the Alternate.

1.5 SELECTION AND AWARD OF ALTERNATES

- A. Bid award will be evaluated on the base bid, or a combination of the base bid and any combination of the Alternate(s). After determination of lowest bidder, alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Owner also reserves the right to defer selection of alternate(s) to a later date, and accept alternates as may be required in order to complete the work.
- B. Following the award of the Contract, the Engineer shall prepare and distribute to each Bidder notification of the status of each Alternate. Notification shall indicate whether Alternates have been accepted, rejected, or deferred for consideration at a later date. It shall also include a complete description of all negotiated modifications to Alternates.

- C. Accepted Alternates will be identified in the Owner-Contractor Agreement, or by Change Order after the Agreement has been executed.

1.6 SCHEDULE OF ALTERNATES

A. UNIT PRICE ALTERNATES

1. Alternate No. 1 shall include, but not be limited to, the following major components, unless indicated otherwise:
 - a. Installation of temporary water main measured from the exact beginning of the pipe to the end of the line without deduction for fittings, bends, and valves. The accepted quantities of temporary water line pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified complete in place. This price shall include labor, equipment, materials, tools, trench excavation (excluding rock), shoring, bracing, or use of trench box, installation, fusion, concrete thrust blocking (where required), pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, clearing and grubbing, fine grading, cleaning and all other work incidental to the complete installation of the mains in accordance with these specifications.
 - b. Installation of temporary water services based on the actual number of each size temporary water service installed. The price stated for this item shall be full compensation for all work and expense incidental thereto for furnishing all materials (including tapping sleeves and valves, tapping saddles, corporations, gate valves, check valves, temporary meters, backflow prevention devices, pipe, fittings, restraints and all other incidentals as may be required for full and complete temporary services), labor, tools and equipment required for a complete and acceptable temporary water service or permanent interconnection of the size indicated on the drawings and Bid Sheet and in accordance with the technical specifications. Restoration of all disturbed areas to match existing is to be included in the unit price. The price stated is to also include excavation, backfilling, testing, chlorinating, bacteriological testing, connection to existing services, and protection of all water services and components. Payment will be at the unit price per temporary service or permanent interconnection of the size stated, complete and in-place. The listed price is to also include removal or abandonment of the temporary service and restoration of all disturbed areas upon connection of the new, permanent water service. The Owner and Engineer shall approve all temporary service connections prior to connection to the existing services. Payment for all appurtenances required for temporary water services is to be included in the cost of the temporary water service, as described herein.

- c. The Base Bid scope of work assumes installation of the proposed 8-inch water main will not impact operation and service of the existing 8-inch water main. The Owner has the option to reject Alternate No.1 or accept Alternate No.1 in its entirety. Wherever Alternate No. 1 is selected by the Owner, the Contractor shall install temporary water main and temporary water services as the means to keep the existing water main and existing water services active during installation of the proposed water main as indicated on the Drawings.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 12 30

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Submittal Procedures
 - 2. Contractor's Construction Schedule
 - 3. Submittal Schedule
 - 4. Shop Drawings
- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Permits
 - 2. Applications for Payment
 - 3. Performance and payment bonds
 - 4. Insurance certificates
 - 5. List of subcontractors
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 12 00 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
 - 2. Division 1 Section 01 13 10 "Project Schedule" specifies additional requirements for the project schedule submittal frequency and format.
 - 3. Division 1 Section 01 14 00 "Quality Control" specifies requirements for submittal of inspection and test reports.
 - 4. Division 1 Section 01 17 00 "Contract Closeout" specifies requirements for submittal of Project Record Documents and warranties at project closeout.
 - 5. All Division 02 Sections

SECTION 01 13 00 – SUBMITTALS

1.3 DEFINITIONS

- A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
- B. NOT USED
- C. NOT USED

1.4 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a) The Engineer or Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
 - 3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
 - a) Allow two (2) weeks for initial review. Allow additional time if the Engineer or Owner must delay processing to permit coordination with subsequent submittals.
 - b) If an intermediate submittal is necessary, process the same as the initial submittal.
 - c) Allow two (2) weeks for reprocessing each submittal.
 - d) No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer or Owner sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 - 1. Include the following information on the label for processing and recording action taken.

SECTION 01 13 00 – SUBMITTALS

- a) Project name
 - b) Date
 - c) Name and address of the Owner
 - d) Name and address of the Engineer
 - e) Name and address of the Contractor
 - f) Name and address of the subcontractor
 - g) Name and address of the supplier
 - h) Name of the manufacturer
 - i) Number and title of appropriate Specification Section
 - j) Drawing number and detail references, as appropriate
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Engineer or Owner using a transmittal form. The Engineer or Owner will not accept submittals received from sources other than the Contractor.
- 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within thirty (30) calendar days after the date established for the "Agreement" or by the Preconstruction Conference.
- 1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."
 - 2. Within each time bar, indicate estimated completion percentage in ten percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 - 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
 5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
 6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Engineer or Owner's procedures necessary for certification of Substantial Completion.
- B. Phasing: On the schedule, show how requirements for phased completion, if required, to permit Work by separate Contractors and partial occupancy by the Owner affect the sequence of Work.
- C. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. At a minimum, revise the schedule monthly. Issue the updated schedule concurrently with the report of each meeting.

1.6 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within ten (10) calendar days of the date required for submittal of the Contractor's Construction Schedule.
1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
 2. Prepare the schedule in chronological order. Provide the following information:
 - a) Scheduled date for the first submittal

SECTION 01 13 00 – SUBMITTALS

- b) Related Section number
 - c) Submittal category (Shop Drawings, Product Data, or Samples)
 - d) Name of the subcontractor
 - e) Description of the part of the Work covered
 - f) Scheduled date for resubmittal
 - g) Scheduled date for the Engineer or Owner's final release or approval
 - B. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
 - C. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made and issue revised schedule to all parties.
- 1.7 DAILY CONSTRUCTION REPORTS (Not Applicable)
- 1.8 SHOP DRAWINGS
- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
 - B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:
 - 1. Dimensions
 - 2. Identification of products and materials included by sheet and detail number
 - 3. Compliance with specified standards
 - 4. Notation of coordination requirements
 - 5. Notation of dimensions established by field measurement

SECTION 01 13 00 – SUBMITTALS

6. Initial Submittal: If an initial submittal is required by the Contractor or Engineer or Owner, submit four (4) blue- or black-line prints for the Engineer or Owner's review. The Engineer or Owner will return two (2) prints.
7. Final Submittal: Submit six (6) blue- or black-line prints as required by the Engineer for distribution. The Engineer or Owner will return two (2) prints to the Contractor.
8. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

1.9 NOT USED

1.10 NOT USED

1.11 NOT USED

1.12 ENGINEER OR OWNER'S ACTION

- A. Except for submittals for the record or information, where action and return is required, the Engineer or Owner will review each submittal, mark to indicate action taken, and return promptly.
 1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Engineer or Owner will stamp each submittal with a uniform, action stamp. The Engineer or Owner will mark the stamp appropriately to indicate the action taken, as follows:
 1. Final Unrestricted Release: When the Engineer or Owner marks a submittal "No Exceptions Taken," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 2. Final-But-Restricted Release: When the Engineer or Owner marks a submittal "Make Corrections Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 3. Returned for Resubmittal: When the Engineer or Owner marks a submittal "Amend and Resubmit" or "Rejected," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

SECTION 01 13 00 – SUBMITTALS

- a) Do not use, or allow others to use, submittals marked "Amend and Resubmit" or "Rejected" at the Project Site or elsewhere where Work is in progress.
- 4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Engineer or Owner will return the submittal marked "Action Not Required."
- C. Unsolicited Submittals: The Engineer or Owner will return unsolicited submittals to the sender without action.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

- A. It shall be the Contractor's responsibility to check shop drawings for accuracy and conformity with the Contract Documents before submission to the Engineer or Owner. Each shop drawing shall be clearly marked "Approved" or "Approved Subject to Noted Corrections," dated and signed by the Contractor before it is submitted to the Engineer or Owner. Any shop drawings not so marked will be returned to the Contractor without the Engineer or Owner's approval. The Engineer or Owner's approval of such shop drawings or schedules shall not relieve the Contractor from responsibility for deviations from the Contract Documents, nor shall it relieve him from responsibility for errors of any sort on shop drawings or schedules.
- B. Submissions at variance with the requirements of the specifications or contract drawings shall be accompanied with a letter setting forth such variations and the credit to be allowed where such variations are less expensive than Contract requirements. If, in the opinion of the Engineer or Owner, such variations are of a minor nature, and comply with the intent of the Contract Documents, approval will be given in writing. When variations are such as to involve a credit to the Owner, approval will be given only upon receipt of a reasonable and proper credit. In the absence of such approvals, the Contractor shall comply with all Contract Document requirements.
- C. The Engineer or Owner's check of shop drawings cover general design only and will not include a quantity check or dimensional verifications. The Engineer or Owner will not undertake the determination of dimensions which, by their nature, must be established from field measurements. The determination of such dimensions shall be a part of the Contractor's checking and coordination of shop drawings. The approval of shop drawings shall not relieve the Contractor from the responsibility for conforming with the Contract Documents unless there is an accompanying letter from him which explicitly states that a deviation is to be made and written approval is obtained for such deviation, nor shall approval of shop drawing relieve him of the responsibility for errors in coordination of his work.
- D. Repairs, modifications, and corrections to other work due to lack of shop drawing data shall be the responsibility of the prime Contractor who failed to supply such

SECTION 01 13 00 – SUBMITTALS

data in sufficient time. Costs of these repairs, modifications, and corrections will be the responsibility of the Contractor.

- E. Where equipment or materials proposed in shop drawings differ from those as shown on the Drawings as to orientation, alignment, etc., the Contractor shall be held liable for providing incidental changes for access, useability, or functionality of such equipment or materials.
- F. Shop drawings will be approved only to the extent of the information clearly shown and identified. Approval of an item of equipment or material shall not be construed to mean approval for components or materials of that kind for which the Contractor has provided no or insufficient information.

END OF SECTION 01 13 00

SECTION 01 13 10 – PROJECT SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Refer to Division 1 Section 01 13 00 “Submittals” for additional requirements to project schedule.
- B. Provide proposed project schedules for entire work.
 - 1. Have initial draft project schedule available to Engineer or Owner prior to preconstruction conference.
 - 2. Revise project schedule monthly.
 - 3. Provide bi-weekly schedule update for anticipated impacts to stakeholders and residents.

1.2 PROJECT SCHEDULES, FORM AND CONTENT

- A. Prepare in form of horizontal bar chart to include:
 - 1. Provide separate horizontal bar column for each trade, operation, or construction activity.
 - 2. Order – Chronological order or beginning and ending of each item of work.
 - 3. Show Schedule of Payments
 - 4. Show critical path in order to meet the established schedule and milestones.
- B. Identify work of separate phases or other logically grouped activities in accordance with Special Conditions and time restraints.
- C. Show projected percentage of completion for each item of work as of first of each month.

1.3 UPDATING

- A. Update at least monthly and submit with pay requisitions for review and approval by Engineer or Owner.
- B. Show all changes occurring since previous submission of updated schedule, including progress of each activity and revised completion dates.
 - 1. Include:
 - a) Major changes in scope
 - b) Activities modified since previous updating

SECTION 01 13 10 – PROJECT SCHEDULES

- c) Revised projections due to changes
- d) Other identifiable changes

1.4 SUBMITTALS

- A. Submit Project Schedules in accordance with Division 1 Section 01 13 00 “Submittals”, and:
 - 1. Prior to Preconstruction Meeting
 - 2. With each monthly payment
 - 3. When requested by Owner or Engineer

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 13 10

SECTION 01 13 90 – PRECONSTRUCTION VIDEO

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The Work of this Section includes, but is not limited to, furnishing a Preconstruction Video consisting of color video recording, with audio description, of surface features along the entire length of the Project. Recording includes all Work areas, easement, and storage areas and all access roadways, and, prior to audio-video recording, visual investigation of all areas to be inventoried with notations made to items not readily visible by recording methods including, but not limited to, size, type and condition of driveways, culverts, headwalls, landscaping, etc. Audio-video recording shall be performed by personnel having experience in similar type Work and shall be done prior to commencement of the construction or delivery of any equipment, material, or supplies to the site of Work.
- B. The purpose of the color audio-video recording of the project is to provide the necessary information for restoration of surface features after completion of the Project. This recording must, therefore, cover the Project area, and delivery routes between Merrit Mill Road and N. Columbia St. along W. Rosemary St. and the project site, in its entirety to assist in replacing those areas affected by construction to their original condition with as little controversy as possible. Video recording shall be performed no more than 30 calendar days prior to construction in the affected area.
- C. Video must be recorded utilizing unmanned aircraft systems (UAV), commonly referred to as drones. Exceptions will be made in project locations where Federal Aviation Administration (FAA), North Carolina Department of Transportation (NCDOT) and local regulations and ordinances prohibit the use of UAV. Prior to completing preconstruction video services, Contractor shall notify Owner of areas where use of UAV is not permitted.

1.2 OWNERSHIP OF RECORDINGS

- A. All recordings produced will become the permanent property of the Owner. The Contractor shall deliver all video files to the Engineer or Owner prior to the beginning of any construction Work.
- B. Any portion of the recorded coverage deemed unacceptable by the Engineer or Owner must be re-recorded by the Contractor at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 ELECTRONIC REQUIREMENTS

- A. Digital Audio format: hard drive containing files of .avi, .mp4, .wmv, or other approved format.
- B. The video should have a resolution of 4K Ultra HD and should be formatted to allow video to be paused and the scale adjusted, while maintaining video quality, as necessary to confirm notations for size, type and condition of various objects, materials and surfaces throughout the video. For example, video quality shall be maintained while adjusting scale, to confirm a change in driveway type, location and extent of damage to driving surfaces, location of catch basins, address numbers on mailboxes.

SECTION 01 13 90 – PRECONSTRUCTION VIDEO

2.2 DEFINITIONS

- A. Access Route(s): for the purpose of this specification section, an access route is defined as a paved path or roadway outside of the limits of disturbance (LOD) where equipment and materials are tracked from delivery trailers into the LOD.

PART 3 - EXECUTION

3.1 COVERAGE OF RECORDING

- A. Site documentation is in accordance with the Contract Documents.
- B. The area to be recorded shall include, but not be limited to, all existing driveways, roadways, sidewalks, curbs, ditches, streets, landscaping, trees, bushes, culverts, catch basins and inlets, stream banks, headwalls, retaining walls, fences, visible utilities including telephone and electrical poles with any overhead lines crossing the site, and all buildings located within the zone of influence of construction. Of particular concern are any existing faults, fractures, defects, or other imperfections exhibited by the above-mentioned surface features. Audio description shall be made simultaneously with and support the video coverage.
 - 1. Streets shall be recorded from the traveled lane adjacent to the work areas where streets are located and runs along one side of the street except where specifically noted otherwise by the Owner.
 - 2. Easement and Right of Entry and Access Areas shall be recorded for the full width of the permanent and temporary easements and all other adjacent areas lying within the zone of influence of "SURFACE" construction as directed by Owner. The size and locations of all easements to be recorded will be shown on the Drawings or otherwise supplied by the Owner.
 - 3. Building Exteriors: The Contractor shall furnish color audio-video recordings of all exterior surfaces of buildings within or adjacent to the Project work area unless accepted otherwise in specific areas by the Owner. At a minimum, any structure or building shall be videotaped if located above the underground operations and within any permanent easement. Buildings so identified may include houses, apartments, garages, and other structures. Exterior building coverage shall include, but not be limited to, walls, visible foundations, chimneys, porches, carports, and trim.
 - 4. Bridges on those areas immediately surrounding and adjacent to any bridges appearing on Drawings shall be audio-video recorded. Exterior bridge supports, structural members, visible footings, side walls, underside, and deck shall receive special although not exclusive attention. Existing cracks, faults, fractures, defects, or other imperfections shall be of particular concern.

3.2 LOCATION OF INFORMATION

- A. All drives shall be properly identified by drive number, location, and project name in a manner acceptable to the Owner.
- B. A record of the contents of each drive shall be supplied on a run sheet identifying each segment in the drive by location, i.e., street or easement number and viewing side, traveling direction, water main stationing, and all referenced by tape counter numbers.

SECTION 01 13 90 – PRECONSTRUCTION VIDEO

- C. A brief report and inventory of all drives completed, referenced by location and disc/drive number, shall be furnished to the Engineer or Owner upon completion of the Work and delivery of the drives.
- D. All video recordings shall begin with the date and time of recording, the project name, the sheet numbers or engineering stationing as shown on the Drawings, the name of the street, easement number or building address being recorded, the direction of travel, and the viewing side.
- E. Houses and buildings shall be identified visually by house or building number, when possible, in such a manner that the progress of the recording and the proposed system may be located by reference to the houses and buildings.
- F. The engineering stationing numbers must be continuous and correspond to the water main stationing and include the standard engineering symbols. This information must appear in the lower half of the viewing screen. Below the engineering stationing shall appear the name of the project, name of the area covered, direction of travel, viewing side, date, time, etc.
- G. Where the engineering station cannot be automatically reproduced on the drive, local landmarks on the route or other recognizable features off to the side of the gravity sewer route shall be visually and audibly noted at frequent intervals to identify the camera location and direction. If necessary, proposed improvements shall be staked and included as part of video recordings to document feature and camera location and direction.
- H. All drives are to be accompanied by a notarized statement verifying the original unedited quality of the videos.

3.3 ENTERING PROPERTY

- A. If it becomes necessary to enter onto private property, the Contractor shall notify the owner of such property at least 24 hours in advance of the planned entry to obtain permission to do so. The Contractor is advised not to enter any private property before permission is granted to do so or the Owner notifies the Contractor that they have gained the legal right to do so. The Contractor shall be held liable for entry made other than stated above. The Contractor shall be responsible for the repair and restoration of any areas damaged during private property entry.

3.4 SITE RECORDING CONDITIONS

- A. All recording shall be done during times of good visibility. No outside recording shall be done during periods of visible precipitation or when the ground area is covered with snow, leaves, or debris unless otherwise authorized by the Owner.
- B. In order to produce the proper detail and perspective, adequate auxiliary lighting will be required to fill in shadow areas caused by trees, utility poles, road signs, and other such objects, as well as other conditions requiring artificial illumination.
- C. The average rate of speed in the general direction of travel of the conveyance used during recording shall not exceed 48 feet per minute. Panning rates and zoom-in / zoom-out rates shall be controlled sufficiently such that playback will produce adequate clarity of the objects being viewed.

SECTION 01 13 90 – PRECONSTRUCTION VIDEO

- D. Cameras shall be mounted and operated in a manner that provides a stable recording and viewing experience, such as a 3-axis stabilizer. Video recordings that are completed without stabilizing equipment will be rejected.
- E. The average height of the camera on the UAV shall be approximately 15 to 20-ft above grade during all recording activities, except where deviation is required due to conflict in the flight path. Elevation of camera should be adjusted to meet requirements for recording key features and return to normal elevation once objects are noted to the quality requirements defined in this specification.

END OF SECTION 01 13 90

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality-control services.
- B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Engineer or Owner.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Engineer, Owner or authorities having jurisdiction are not limited by provisions of this Section.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 13 00 "Submittals" specifies requirements for development of a schedule of required tests and inspections.

1.3 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide and pay for inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

SECTION 01 14 00 – QUALITY CONTROL

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
 2. Prior to start of Work, submit to Engineer or Owner in accordance with Division 1 Section 01 13 00 "Submittals", testing agency name, address, telephone number, names of full-time testing agency personnel, field inspector, and responsible project manager. Testing agency will be subject to the approval of the Engineer or Owner.
 - a) Testing agency shall be authorized to operate in the State of North Carolina.
 - b) Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
 - c) The same independent firm shall perform retesting. Contractor shall pay for retesting required by the failure of the initial test to meet the requirements of the Specifications at no additional cost to the Owner.
 3. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services. The Contractor shall assist the Owner by providing labor and equipment for excavation of test pits, excavation for test pads for density tests, and moving testing equipment around the project site. The Owner shall retain the services of a testing laboratory to perform testing required at the project site for field density tests of fill and backfill material and concrete testing for slump, air entrainment, and strength.
 4. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.
- B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.
1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements. The cost to repair, rework, or replace material or work indicated as noncompliant shall be borne by the Contractor.

- C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
1. Provide access to the Work.
 2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
 4. Provide facilities for storage and curing of test samples.
 5. Deliver samples to testing laboratories.
 6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 7. Provide security and protection of samples and test equipment at the Project Site.
- D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Engineer or Owner and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
1. The agency shall notify the Engineer or Owner and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
 3. The agency shall not perform any duties of the Contractor.
- E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.4 SUBMITTALS

- A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection,

test, or similar service to the Engineer or Owner. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
 - a) Date of issue
 - b) Project title and number
 - c) Name, address, and telephone number of testing agency
 - d) Dates and locations of samples and tests or inspections
 - e) Names of individuals making the inspection or test
 - f) Designation of the Work and test method
 - g) Identification of product and Specification Section
 - h) Complete inspection or test data
 - i) Test results and an interpretation of test results
 - j) Ambient conditions at the time of sample taking and testing
 - k) Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
 - l) Name and signature of laboratory inspector
 - m) Recommendations on retesting

1.5 QUALITY ASSURANCE

- A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the latest edition of the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.
 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

SECTION 01 14 00 – QUALITY CONTROL

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes.
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 01 14 00

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities may include, but are not limited to, the following:
 - 1. Water service and distribution
 - 2. Temporary electric power and light
 - 3. Temporary heat
 - 4. Telephone service
 - 5. Sanitary facilities, including drinking water
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds
 - 2. Temporary roads and paving
 - 3. Dewatering facilities and drains
 - 4. Temporary enclosures
 - 5. Temporary project identification signs and bulletin boards
 - 6. Waste disposal services
 - 7. Construction aids and miscellaneous services and facilities
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary security fencing
 - 2. Temporary fire protection
 - 3. Barricades, warning signs, and lights
 - 4. Sidewalk bridge or enclosure fence to protect pedestrians

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

5. Environmental protection

1.3 SUBMITTALS

- A. Contractor to submit a plan for temporary services to the Engineer or Owner for approval prior to installation in accordance with Division 1 Section 01 13 00 "Submittals". The plan for temporary services is to include a list of all temporary services, including location of temporary water supply and connections, identification of each temporary water service connection as connected to a temporary water main or existing water main, identification of all proposed materials, methods of backflow prevention and metering, methods of sterilization prior to connection, estimated duration of use of each temporary service, means by which to ensure water quality, means by which to protect temporary water services, means by which to identify temporary water services and connections, along with any other pertinent information relating to the installation and maintenance of the temporary water services.

1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements
 - 2. Health and safety regulations
 - 3. Utility company regulations
 - 4. Police, fire department, and rescue squad rules
 - 5. Environmental protection regulations
- B. Standards: Comply with the latest editions of NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with the latest editions of NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Engineer or Owner, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. For fences and vision barriers, provide minimum 3/8-inch thick exterior plywood.
- C. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood.
- D. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- E. Water: Provide potable water approved by local health authorities.
- F. Open-Mesh Safety Fencing: Provide 0.120-inch thick, galvanized 2-inch chainlink fabric fencing 6 feet high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches I.D. for line posts and 2-1/2 inches I.D. for corner posts or as otherwise required by the Town of Chapel Hill, Town of Carrboro, or UNC-Chapel Hill.

2.2 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the Engineer or Owner, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- F. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- G. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
 - 1. Comply with the latest editions of NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- H. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated by Owner to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
 - 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
 - a) All sign layout and lettering details must be submitted to OWASA for approval.
 - b) The sign must meet requirements of Town of Chapel Hill, Town of Carrboro, or UNC-Chapel Hill ordinances and permits, if applicable.
 - c) The field of the sign shall consist of a 4-foot by 8-foot sheet of grade B-B medium density overlaid exterior plywood.
 - d) Unless otherwise approved by OWASA, the sign shall be mounted with 4-inch by 4-inch posts, using B or better Southern pine, pressure-preservative treated in accordance with AWPAC1 and AWPAC2, with aluminum or galvanized steel screws. Mounting posts shall be buried to a minimum depth of 3 feet.
 - e) Computer-cut vinyl decal shall be used.
 - f) If directed by OWASA, an exterior/outdoor brochure holder shall be mounted on sign or mounting post (near QR code).
 - 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
 - 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer. Neither the Owner nor Engineer will accept cost or use charges as a basis of claims for Change Orders.
- B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.
 - 1. Sterilization: Sterilize temporary water piping prior to use.
 - 2. All temporary services materials (including piping, valves, tubing, fittings, etc.) must be of new material, not having previously been utilized for temporary or permanent water service
 - 3. Contractor is responsible for providing all labor, equipment, and new materials required for complete installation of temporary water services, including all associated maintenance, protection, and repairs as may be required
 - 4. Acceptable materials for temporary water mains and water services shall be NSF 61 approved for potable water service. Acceptable materials include:
 - a) Temporary Mains: HDPE minimum DR 9

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- b) Temporary Service Piping: Soft copper and polyethylene
 - c) Temporary Service Fittings and Valves shall be compatible with proposed temporary service materials.
 - d) Temporary Fittings, Valves and Fire Hydrants shall be compatible with proposed temporary main materials.
 - e) Tapping Sleeves: Stainless steel and ductile iron.
 - f) Tapping Saddles: Stainless steel, brass, and ductile iron.
 - g) Other: Provide temporary air release valves and check valves as may be required. All temporary service materials must be suitable for active working pressures in excess of 200 psi.
- C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.
- 1. Install electric power service underground, except where overhead service must be used.
 - 2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- D. Temporary Lighting: Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions
- E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- F. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.
- 1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited unless approved by the Owner and Engineer for specific site conditions.

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- G. Temporary Telephones: Provide cell telephones for all supervisory personnel engaged in construction activities.
- H. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - 1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
 - 2. Facilities shall remain locked at all times. Contractor shall maintain facilities to prevent spilling sewer.
- I. Toilets: Use of the Owner's existing toilet facilities will not be permitted.
- J. Toilets: Install sufficient number of self-contained toilet units.
- K. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Locate storage sheds, and other temporary construction and support facilities for easy access.
 - 1. Maintain support facilities until Substantial Completion and remove after Substantial Completion.
- B. Provide incombustible construction for sheds located within the construction area or within 30 feet of building lines. Comply with the latest requirements of NFPA 241.
- C. Field Offices: Not Required.
- D. Temporary Roads and Parking: Construct and maintain temporary roads to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary roads, storage areas, and parking where the same permanent facilities will be located.
- E. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. Where heat is needed, provide temporary enclosures where there is no other provision for containment of heat. Coordinate ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
- G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) calendar days during normal weather or three (3) calendar days when the temperature is expected to rise above 80 degrees F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Engineer or Owner.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with the latest editions of NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
1. Locate fire extinguishers where convenient and effective for their intended purpose.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

SECTION 01 15 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- D. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Engineer or Owner requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property.
 - 2. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a) Replace significantly worn parts and parts subject to unusual operating conditions.

END OF SECTION 01 15 00

SECTION 01 15 70 – TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Construction Parking Control
- B. Flaggers
- C. Flares and Lights
- D. Haul Routes
- E. Traffic Signs and Signals
- F. Removal

1.2 RELATED SECTIONS

- A. Division 1 Section 01 10 00 – “Summary of Work”
- B. Division 1 Section 01 15 00 – “Construction Facilities and Temporary Controls”

1.3 REFERENCE

- A. Latest Edition of North Carolina Department of Transportation (NCDOT) Publication 203 - *Work Zone Traffic Control*.

1.4 SIGNS, SIGNALS, AND DEVICES

- A. Post Mounted Traffic Control: Specified in NCDOT Publication 203.
- B. Flagger Equipment/Apparel, traffic cones, drums, flares, and lights shall be NCDOT approved when working on State highways.
- C. Traffic control schemes as shown in Publication 203 shall be used on State highways for respective operations.
- D. Local jurisdictions may apply in other areas of application.

1.5 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Authority's operations.
- B. Monitor parking of construction personnel vehicles. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.
- D. Parking along residential streets is strictly prohibited. Contractor is responsible for mobilizing personnel and equipment to prevent the use of residential streets for parking.

1.6 CONSTRUCTION SITE WORK/DELAYS

- A. Provide trained and equipped flagging personnel to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- B. When extended delays to traffic movement are anticipated while working in highways and streets, the Contractor shall notify all School Bus operations at least 48 hours in advance.
- C. Public shall also be notified in advance by newspaper and radio announcements.
- D. Any detours shall be approved by respective jurisdiction.

1.7 FLARES AND LIGHTS

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

1.8 HAUL ROUTES

- A. Consult with Authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
 - 1. Includes providing roadways signage, if necessary, and flaggers when mobilizing equipment and materials

1.9 TRAFFIC SIGNS AND SIGNALS

- A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- B. Relocate as work progresses to maintain effective traffic control.
- C. Install per Drawings. No changes will be allowed unless permitted in writing by Engineer or Owner.

1.10 TRAFFIC SIGNAL LOOPS

- A. Refer to the requirements on the Drawings when traffic signal loops are disturbed during construction.
- B. Traffic signals shall not be operated without the traffic signal loops for more than ten (10) business days.
- C. Contractor shall use the Town of Chapel Hill authorized contractor for repair and installation of traffic signal loops on Town-owned streets. Contact the Town of Chapel Hill Traffic Engineering Department for authorized contractor(s).

SECTION 01 15 70 – TRAFFIC CONTROL

1.11 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings.

END OF SECTION 01 15 70

SECTION 01 16 00 – MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 10 95 "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 - 2. Division 1 Section 01 13 00 "Submittals" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

- A. Definitions used in this Section are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a) "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

SECTION 01 16 00 – MATERIALS AND EQUIPMENT

1.4 SUBMITTALS

- A. Provide submittals for Materials and Equipment as outlined in Division 1 Section 01 13 00 "Submittals".

1.5 QUALITY ASSURANCE

- A. All material and equipment shall be furnished by manufacturers who shall have at least three (3) years experience in the design, production, assembly, and field service of the equipment of like type, size, and capacity. Where required by the Engineer or Owner, the Contractor shall supply a list of at least three (3) successful installations in situations similar to those anticipated for this Project. If experience requirements cannot be met, then manufacturers may post a bond or a cash deposit in such amount sufficient to allow replacement of the equipment with that shown on the Drawings and specified herein. Said bond or deposit to be applicable to any costs occasioned to the Owner in the event that the equipment supplied fails to meet performance standards specified herein. Said costs shall include purchase of replacement equipment, necessary demolition, structural and pipework modifications, controls replacement and rewiring, and other required appurtenances and incidentals necessary for the equipment replacement, including engineering costs for redesign and administration of construction and all required testing services, also including any increased operational or maintenance expenses that might have been incurred. The period for the bond shall be for three (3) years less the manufacturer's actual experience.
- B. It is the intent of the Contract Documents to procure the best equipment and services available for the intended duty. Only those manufacturers' products will be accepted, who, in the judgement of the Engineer or Owner, can provide:
 - 1. the design services of an engineering staff in the manufacturer's employ (regularly and continuously on the manufacturer's payroll or with whom the manufacturer has and continues to have a contractual agreement to provide consulting engineering service), skilled in the application of the particular type of equipment required under the Contract;
 - 2. shop facilities adequate for and personnel skilled in the fabrication and assembly of the equipment of the type and size required on this Project;
 - 3. field service personnel in the manufacturer's employ, trained and skilled in the adjustment, servicing and repair of the equipment of like size, type, and capacity.
- C. The Engineer or Owner may require, and Contractor shall furnish, if directed, the data required to demonstrate compliance with requirements of this item, and that stipulated in the Information for Bidders. The judgement of the Engineer or Owner shall be final in all cases.
- D. Compatibility of Options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected to the extent possible.

E. Nameplates:

1. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface. The nameplate shall contain the following information and other essential operating data:
 - a) Name of product and manufacturer
 - b) Model and serial number
 - c) Capacity
 - d) Speed
 - e) Ratings

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 - 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 - 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
 - 1. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - 2. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - 3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements. Comply with the Contract Document provisions concerning "submittals" to obtain approval of products based on performance requirements.
 - 4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
 - a) Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.

- b) Comply with the Contract Document provisions concerning submittals to obtain approval of products based on performance requirements.
- 5. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
- 6. Visual Matching: Where Specifications require matching an established Sample, the Engineer or Owner's decision will be final on whether a proposed product matches satisfactorily.
 - a) Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.
- 7. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Engineer or Owner will select the color, pattern, and texture from the product line selected.
- 8. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Contract Documents for allowances that control product selection and for procedures required for processing such selections.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 - 1. When equipment of any kind is to be installed in a building or structure and minor changes are necessary in the building or structure to accommodate the equipment, such changes shall be considered incidental to the proper completion of the work, and shall be made by the Contractor without additional compensation therefor.
 - 2. Manufacturers furnishing equipment shall include in their quotation the services of a qualified field representative to inspect the equipment installation, make necessary adjustments and field test prior to the equipment being placed in service. He shall then place the equipment in permanent operation. Such representative shall be furnished and shall be present on the job site without delay, upon request of the Contractor and/or Engineer or Owner. The Contractor shall cause the representative to submit by letter to the Owner the results of the equipment inspection

SECTION 01 16 00 – MATERIALS AND EQUIPMENT

and attest to proper installation and operation thereof or detail deficiencies and list remedies therefor.

3. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 16 00

SECTION 01 17 00 – CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures
 - 2. Project record document submittal
 - 3. Operation and maintenance manual submittal
 - 4. Submittal of warranties
 - 5. Final cleaning
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 3.

1.3 SUBSTANTIAL COMPLETION

- A. Refer to the General Conditions for definition of Substantial Completion.
- B. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
 - a) Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b) If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise the Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Submit record drawings, maintenance manuals, damage or settlement claims, and similar final record information.
 - 6. Deliver tools, spare parts, extra stock, and similar items.

SECTION 01 17 00 – CONTRACT CLOSEOUT

7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
 9. Complete final cleanup requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred, exposed finishes.
- C. Inspection Procedures: On receipt of a request for inspection, the Engineer or Owner will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Engineer or Owner will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Engineer or Owner will repeat inspection when, in the Engineer or Owner's opinion, the Work is substantially complete.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.
 3. Other authorities having jurisdiction may require additional inspections as required to fulfill permitting requirements. Contractor shall provide personnel for these additional inspections and address any deficiencies found during the inspection, at no additional cost to the Owner.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Engineer or Owner's final inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.

5. Submit a final liquidated damages settlement statement.
 6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 7. Submit consent of surety to final payment.
 8. Submit contractor's and subcontractor's Affidavit of Release of Liens
 9. Submit contractor's Affidavit of Payment of Debts and Claims
 10. Submit Release of Liens from material and equipment suppliers.
- B. Reinspection Procedure: The Engineer or Owner and other authorities of jurisdiction will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Engineer or Owner.
1. Upon completion of reinspection, the Engineer or Owner will prepare a certificate of final acceptance. If the Work is incomplete, the Engineer or Owner will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
- 1.5 RECORD DOCUMENT SUBMITTALS
- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Engineer or Owner's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
 3. Note related change-order numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

SECTION 01 17 00 – CONTRACT CLOSEOUT

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operation and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 - 1. Maintenance manuals
 - 2. Record documents
 - 3. Spare parts and materials
 - 4. Tools
 - 5. Lubricants
 - 6. Identification systems
 - 7. Hazards
 - 8. Cleaning
 - 9. Warranties and bonds
 - 10. Maintenance agreements and similar continuing commitments
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 - 1. Startup
 - 2. Shutdown
 - 3. Emergency operations
 - 4. Safety procedures
 - 5. Economy and efficiency adjustments

3.2 FINAL CLEANING

- A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1 Section 01 15 00 "Construction Facilities and Temporary Controls".
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - 1. Clean-up operations shall consistently be carried on by the Contractor at all times during the Project to keep the premises free from accumulation of waste materials and rubbish. Upon completion of the Work, the Contractor shall remove all rubbish, tools, scaffolding, surplus materials, etc., from the Site and shall leave the Work in a condition satisfactory to the Engineer or Owner.
 - 2. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
 - a) Remove labels that are not permanent labels.

SECTION 01 17 00 – CONTRACT CLOSEOUT

- b) Remove all surplus and discarded materials, excavated material and rubbish from the roadways, sidewalks, parking areas, lawns and all adjacent property; restore, in an acceptable manner, all property, both public and private, which has been disturbed or damaged during the prosecution of the Work; and shall leave the entire Site in a neat and presentable condition.
 - c) Clean exposed exterior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete surfaces broom clean.
 - d) Wipe surfaces of mechanical equipment. Remove excess lubrication and other substances.
 - e) Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property or private properties. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
 - 1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.
 - 2. In case of dispute, the Owner may remove the rubbish and charge the cost to the Contractor as the Engineer or Owner shall determine to be just.

END OF SECTION 01 17 00

PART 1 - GENERAL

1.1 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Change Orders
 - 6. Other Modifications to Contract
 - 7. All Test Records
- B. Store documents in approved location in addition to and apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. File documents in accordance with Engineer or Owner approved format.
- E. Maintain documents in clean, dry, legible condition.
- F. Do not use record documents for construction purposes.
- G. Make documents available at all times for inspection by the Engineer, Owner, State, or Federal Representative.
- H. Refer to Division 1 Section 01 17 00 "Contract Closeout" for additional Record Drawing submittal requirements.

1.2 RECORDING BY CONTRACTOR

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.
- B. Keep Record Documents current and orderly.
 - 1. Keep complete index with document name and location stated; number each document.
- C. Do not permanently cover or conceal any work until required information has been recorded.
- D. Contract Drawings
 - 1. Refer to Records Drawings contents list at the end of this Section.
- E. Specifications and Addenda
 - 1. Legibly mark up each Section to record:

SECTION 01 17 20 – PROJECT RECORD DOCUMENTS

- a) Manufacturer, trade name, catalogue number, and Supplier of each product and item of equipment actually installed.
- b) Changes made by Change Order or Field Order.
- c) Other matters not originally specified.

F. Shop Drawings

- 1. Maintain as Record Documents; legibly annotate on a set of Contract Drawings the actual construction conditions.

1.3 SUBMITTAL

- A. At monthly project meetings present progress drawings with Contractor's invoice. **No payment will be made on Contractor's monthly invoices until Contractor demonstrates to the Engineer or Owner's Authorized Representative that Record Drawings are up to date.**
- B. At completion of project, deliver Final Record Documents to Engineer or Owner.
- C. Accompany Record Documents with transmittal letter in duplicate containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each Record Document
 - 5. Certification that each document as submitted is complete and accurate
 - 6. Signature of Contractor, or Contractor's authorized representative

PART 2 - PRODUCTS

2.1 RECORD DRAWING REQUIREMENTS

- A. Record Drawings must document all important deviations from original Drawings made during construction.

2.2 TITLE SHEET

- A. Prime Contractor - Name and Address
- B. All major Subcontractors - Name and Address
- C. Resident Project Representative
- D. Buried or concealed materials used on Project.
- E. For all valves, indicate the number of turns to open and indicate direction to open (clockwise or counter-clockwise).
- F. A bold note to indicate that the set of plans are "Record Drawings".

2.3 SEWER AND WATER LINES

SECTION 01 17 20 – PROJECT RECORD DOCUMENTS

- A. Accurately record final routing of all pipeline, manhole, valve, and appurtenance locations, including dimensions from buildings or other fixed objects, as reference points.
- B. Indicate changes to all pipeline, manhole, or other infrastructure locations as applicable.
- C. Show actual locations and at least three (3) tie-in locations to manholes, valves, vaults, and associated appurtenances. Show as-built rim and invert elevations.
- D. Revise the following construction drawings to indicate as-built conditions:
 - 1. Overall Site Plan and/or Index
 - 2. Plan and Profile Drawings
 - 3. Construction Details

2.4 ELECTRICAL WORK (NOT USED)

2.5 DETAIL SHEETS

- A. Indicate when any details are not used or not applicable. Example - If three alternates for pavement are on detail sheet, the two not used shall be so noted. (Box and cross out unused details).

2.6 GENERAL CONSTRUCTION

- A. Denote all areas where any existing utility was repaired, replaced, or relocated. Show correct location if Drawing location was incorrect.
- B. Note and accurately locate all existing underground utilities encountered during construction, in both plan and profile, whether shown on the Drawings or not.

PART 3 – EXECUTION

3.1 AFFIDAVIT

- A. Complete and execute the attached affidavit when submitting final copies of Record Drawings. Final payment will be withheld until such time as the Record Drawings are complete and the Contractor has submitted the Affidavit.

SECTION 01 17 20 – PROJECT RECORD DOCUMENTS

**AFFIDAVIT
FOR RECORD DRAWINGS**

_____, the CONTRACTOR on _____
(Contractor) (Project title per Contract Documents)

hereby certifies that the enclosed Record Drawings show all changes made during construction, as required under Sections 01 17 00 and 01 17 20 of the Contract Documents.

By: _____
CONTRACTOR (Authorized Signature)

Sworn to and subscribed before me this _____ day of _____, ____.

NOTARY PUBLIC

The manhole rim and invert elevations have been surveyed by _____, a North Carolina licensed land surveyor. This firm completed the post construction surveys and hereby certifies that the information presented on the final record drawing is true and accurate as verified by field surveys.

END OF SECTION 01 17 20

SECTION 01 17 40 – WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01 13 00 "Submittals" specifies procedures for submitting warranties.
 - 2. Division 1 Section 01 17 00 "Contract Closeout" specifies contract closeout procedures.
 - 3. All Division Sections for specific requirements for warranties on products and installations specified to be warranted.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

- A. Equipment Warranty: All equipment shall have a one-year warranty period from the date of Substantial Completion and acceptance by the Owner. The warranty period shall cover the full cost of repairs and replacement to include all labor, travel expenses, parts, taxes and freight so as to be no cost to the Owner. If the

SECTION 01 17 40 – WARRANTIES

equipment in need of repair and replacement is critical to the function of the Owner's facility, then the Contractor shall expedite this replacement to include express freight charges and additional cost for labor.

- B. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the full cost **(including labor if straight time or overtime is required, travel expenses, parts, taxes and freight)** of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life. Equipment that the Owner or Engineer deems critical to the Work shall be replaced immediately or the Contractor shall be held responsible for the damaged caused by not replacing the equipment. Contractor shall expedite the replacement of critical items to include express freight charges and additional cost for labor.
- E. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- F. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS

- A. Submit written warranties to the Engineer or Owner prior to the date certified for Substantial Completion. If the Engineer or Owner's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer or Owner.
 - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the

SECTION 01 17 40 – WARRANTIES

construction period, submit properly executed warranties to the Engineer or Owner within 15 calendar days of completion of that designated portion of the Work.

- B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Engineer, for approval prior to final execution.
- C. Refer to remainder of project manual for specific content requirements and particular requirements for submitting special warranties.
- D. Form of Submittal: At Final Completion compile three (3) original copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.
- E. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8.5-inch by 11-inch paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
 - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
 - 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 17 40

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

This Section forms a part of the Contract Documents and modifies the Technical Specifications as necessary for the Project. Documents with changes are as noted below.

1. Section 02275 – Trenching, Backfilling and Compaction of Utilities

A. Article 1.2 – “Relocated Documents”

Delete “Section 02520-Reclaimed Water”

B. Article 1.2 “Related Documents:

Insert the following: “Section 02370-Erosion and Sedimentation Controls; Section 02900 Lawns and Grasses;

C. Article 1.5.B, add the following as item 3):

“Laboratory tests indicating compressive strength of all flowable fill, excavatable fill and other concrete based materials to be used on the project”

D. Article 1.9 D:

Delete “safe a satisfactory” and replace with “safe and satisfactory”.

E. Article 1.11:

Insert the following Article “F. Contractor shall refer to the latest requirements from the Town of Chapel Hill, for replacement of existing materials and surface features impacted by any construction activities, including but not limited to excavation and backfill, compaction of backfill materials, pavement courses and installation, curb and gutter replacement, sidewalk replacement, topsoil installation, seeding, and landscaping replacement.”

F. Article 1.13 Paragraph 1:

Delete the first two sentences in Paragraph 1 and replace with “The Contractor shall install all erosion and sedimentation control devices and measures as shown in the Contract Documents, and follow all local and state requirements regarding sedimentation and erosion control.”

G. Article 1.13 Paragraph 2:

Insert “Contractor is liable for damages to public and private property and fines as may be placed on the Project by the governing agencies due to failure to provide adequate erosion control devices.”

H. Article 1.13, page 9, items 1) through 5):

Renumber as items 2) through 6)

I. Article 1.13.B.1), insert the following as item “c.”

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

“See approved Erosion and Sedimentation Control permit, Construction Stormwater Permit, and Town of Chapel Hill requirements. The more stringent requirements shall apply.”

- J. Article 2.1.A.3).a: delete second paragraph and replace with:

“Excavatable fill shall be installed as indicated on the plans. Excavatable fill shall have a compressive strength between 50 and 150 PSI.”

- K. Article 2.1.A.3).c: Add this paragraph as paragraph c.:

“Cellular concrete for pipe abandonment – Abandonment of the existing water lines may be completed using cellular concrete. If Contractor uses cellular concrete, Contractor shall subcontract with OWASA approved cellular concrete installer, CJGeo Contractors, to inject cellular concrete into the existing sewer lines at the locations shown on the plans. The Contractor shall be responsible for all items associated with abandonment of the existing sewer lines not listed in CJGeo Contractors scope of work, including: providing access to the injection points and existing water line at the locations identified on the plans, preparation of the existing sewer line for abandonment. The Contractor shall be responsible for installing plugs and other appurtenances and ensure cellular concrete shall not be installed beyond the limits identified on the plans. Cellular concrete shall have a minimum compressive strength of 9,150 PSF.”

- L. Article 2.1.A.6).b:

Insert “North Carolina Licensed Professional” before “Geotechnical Engineer”.

- M. Article 2.2.A.4):

Delete the word “Geotechnical” from this Article.

- N. Article 3.1.A.3): delete paragraph and replace with:

“Access and/or Haul Roads: If grading, excavation, clearing or other disturbance is required to access the site, Contractor shall submit a written request to Engineer and OWASA a minimum of 60 days prior to construction. Contractor will be responsible for coordinating with Engineer to obtain approval from the Town of Chapel Hill and NCDEQ for additional disturbance.

- O. Article 3.1.B:

Add the following Item “6.) Any damage to vegetation outside of the limits of construction shall be repaired by Contractor at no additional expense.”

- P. Article 3.1.G.6):

Add the following:

“Excessive use of undercut excavation and additional stone bedding is not an alternative to proper dewatering techniques.”

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

Q. Article 3.2.E.):

Add the following paragraph:

“For measurement purposes, the trench width shall be 2 feet. Excessive blasting, rock excavation, and replacement with select material will not be considered for payment.”

R. Article 3.2, page 40, items A) through H):

Relabel as items D) through K)

S. Article 3.8.B.10)

Delete “250” and replace with “1,000”

T. Article 3.11, first paragraph:

Delete and replace with: “Contractor shall install the creek crossings per the drawings and approved permits. Contractor shall provide temporary cofferdam, bulkhead, or other method as approved and included in the Contract Documents. Horizontal directional drill, or other trenchless methods are not approved for this project.”

U. Article 3.8

Delete Article in its entirety

V. Article 3.16.B:

Delete “For reclaimed water mains see section 02520.”

W. Article 3.16.C

Delete “minimum strength 225 psi)” and place with “compressive strength range of 50 to 150 psi).”

2. Section 2530 – Sanitary Sewer

A. Article 1.6.B:

Insert the following as item 3): “PVC Pipe Markings shall be as follows:

- a. Diameter
- b. Class or nominal thickness
- c. Manufacturer’s identifying mark”

B. Article 1.8.A.1):

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

Insert the following “All rejected or damaged pipe shall be replaced at no additional cost to OWASA.”

C. Article 2.2.F:

At the end of the second paragraph, insert following additional paragraphs:

“Tracer wire shall only be installed on non-ferrous and non-metallic pipe placed within rights-of-way, easements, as directed by the Engineer, or as shown on the Drawings. Wire shall be run continuously along the pipe and shall be securely taped to the outside of the pipe. All splices in the wire shall be made by use of an underground rated, watertight, and approved splice connector. No twisting of wire ends is permitted. The tracer wire shall not be wrapped around the pipe, flanges, bells, or other appurtenances.

The tracer wire shall be accessible above ground at each manhole structure, cleanout casting, valve box, or water meter. For manhole structures, the tracer wire shall be brought to grade and securely fastened to the exterior of the manhole structure. For cleanouts, valve boxes, and water meters, the tracer wire shall be brought to grade and securely fastened to the interior of the cleanout frame, valve box, or water meter box.

Tracer wire shall be tested for continuity in the presence of the Engineer prior to final acceptance. Any wire that is not continuous shall be repaired at the Contractor's expense.”

D. Article 2.2.P:

Delete this Article in its entirety.

E. Article 3.1.A.2):

Insert “and in accordance with Section 02275 – Trenching, Backfilling and Compaction of Utilities” after “detail 531.01”.

F. Article 3.1.A.8):

Delete “When the trench is left for the night or”

G. Article 3.1.C.1):

Delete this Article in its entirety.

H. Article 3.3.B):

Delete all three paragraphs and replace with: “See details for pipe slope and inside drops permitted by OWASA for this project.”

I. Article 3.4.B

Add the following to the end of the paragraph: “Select manholes are to be abandoned using a different method. See drawings for additional information.”

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

J. Article 3.6.I:

Remove “During service installation or line rehabilitation on existing mains” and add “During service installation, line rehabilitation, or line replacement on existing mains”.

K. Article 3.10 :

Delete this Article in its entirety.

3. Section 02510 – Water Distribution

A. Article 1.7:

Insert the following Article “4. All rejected or damaged pipe shall be replaced at no additional cost to OWASA.”

B. Article 2.3:

Add “M. COPPER TO PVC TRANSITION COUPLINGS

2-inch diameter copper to PVC transition couplings shall be Mueller Company Part Number P-15403N, Ford Meter Box Company Part Number C44-77-G-NL, or acceptable equal.”

C. Article 3.1

Insert the following Article “G. INSERT VALVES – BASIS OF BID

The following specification is the basis of bid and any “or equals” are acceptable if approved by the Engineer.

The DI 250 psi Insert valve shall be a resilient wedge gate valve design for use in potable water. The design of the valve will allow the valve to be installed into an existing pressurized pipeline while maintaining constant pressure and service as usual. After closing the wedge and adequately restraining the valve body the downstream pipe can be completely removed and replaced. The host pipe shall not be a permanent component of the Insert Valve. The Insert Valve shall be restrained prior to closing the wedge as indicated on the drawings.

The InsertValve shall be UL listed and approved to NSF/ANSI Standard 61-Drinking Water System Components.

Certified Installer:

Team InsertValve must be installed by companies trained and authorized by Team. All such installers have received written certificates and shall provide documentation validating their certification.

Ductile Iron Construction:

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

The ductile iron body, bonnet and wedge provide strength and a pressure rating that meets or exceeds the requirements of AWWA C515. InsertValve shall be ductile iron construction meeting ASTM A536 Grade 65-45-12. Heavy-duty ductile iron construction for maximum toughness and strength.

Chemical and modularity tests shall be performed as recommended by the Ductile iron Society, on a per ladle basis. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

Sizes 12" and smaller must be capable of working on Cast/Grey Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel, AC pipe diameters without changing either top or bottom portion of split valve body.

250 psig maximum working pressure. The pressure rating markings must be cast into the body of the InsertValve.

After the installation of the InsertValve body on to the existing pipe a pressure test of 1.1 times that of the contents shall sustained for 15 minutes. Once the pressure test is effectively achieved the InsertValve body must not be moved in accordance with AWWA Standards. If the InsertValve is moved the pressure test must be completed again. The InsertValve must not be moved or repositioned once the pressure test is achieved.

Resilient Wedge Gate Assembly:

The construction of the Resilient Wedge shall comply with AWWA C509 requirements.

The ductile iron wedge shall be fully encapsulated with EPDM rubber by a high pressure and high temperature compression or injection mold process. This will assure the ductile gate is fully coated with molded rubber – no exposed iron.

The resilient wedge shall seat on the valve body and not the pipe to obtain the optimum seating and flow control results. The resilient wedge shall be totally independent of the carrier pipe.

The resilient wedge shall not come into contact with the carrier pipe or depend on the carrier pipe to create a seal. Abrasion results thus shortening the life and quality of the shut down if the wedge contacts the pipe.

Pressure equalization on the down or upstream side of the closed wedge shall not be necessary to open the valve.

The wedge shall be symmetrical and seal equally well with flow in either direction.

The Resilient wedge must ride inside the body channels to maintain wedge alignment throughout its travel to achieve maximum fluid control regardless of high or low flow pressure or velocity.

Oversized flow way. Unobstructed to provide optimum flow.

Fusion-Bonded Epoxy:

The InsertValve is fully epoxy coated on the interior and the exterior. The fusion-bonded coating is applied prior to assembly so that even the bolt holes and body-to-bonnet flange surfaces are fully epoxy coated.

Valve shall be coated with a minimum of 10 mils epoxy in compliance with AWWA C550 and certified to ANSI/NSF-61.

Gaskets and Triple O-Ring Stem Seals:

This InsertValve features triple O-Ring stem seals. Two O-Rings are located above, and one O-Ring is located below the thrust collar.

The lower two O-Rings provide a permanently sealed lubrication chamber that will make the valve easier to operate over a longer period of time. The upper O-Ring ensures that sand, dirt or grit cannot enter the valve to cause damage to the lower O-Rings. This is especially important for buried and sewage service applications.

Side flange seals shall be of the O-Ring type of either round, oval, or rectangular cross-sectional shape.

Valve Stem & Thrust Washers:

The gate valve stem and wedge nut shall be copper alloy in accordance with Section 4.4.5.1 of the AWWA C515 Standard.

The NRS stem must have an integral thrust collar in accordance with Section 4.4.5.3 of AWWA C515 Standard. Two-piece stem collars are not acceptable. The wedge nut shall be independent of the wedge and held in place on three sides by the wedge to prevent possible misalignment.

Two thrust washers are used. One is located above, and one is located below the stem thrust collar. Two thrust washers ensure easy operation at all times.

NRS with AWWA standard turns.

Operated by 2" square wrench nut according to ASTM A126 CL.B – open left or open right

American Made Quality:

All primary parts and components to be exclusively and completely assembled, manufactured, machined and coated in the USA.

The purchaser shall, with reasonable notice, have the right to plant visitation at his/her expense.

Hardware:

Bolting materials shall develop the physical strength requirements of ASTM A307 with dimensions conforming to ANSI B18.2.1.

Extended Life Value:

The stuffing box, operating stem and resilient wedge (complete bonnet and all moving parts) shall be removable, repairable and or replaceable under pressure. In other words, even while the valve is fully pressurized in the system all moving components can be removed under pressure. In the event the valve stem is broken or damaged the bonnet can be removed under pressure.

Internal pressure equalization system assures the safe entry and removal of the valve bonnet during initial installation as well as future maintenance. This alleviates the need for additional pipe penetration taps or foreign methods (i.e. compressed air or auxiliary water source) to equalize pressure.

Split Restraint Devices:

Shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.

The devices shall have a working pressure rating of 350 psi for 4-12 inch. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.

Chemical and modularity tests shall be performed as recommended by the Ductile iron Society, on a per ladle basis. Three test bars shall be incrementally poured per production shift as per U.L. specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

Gland body wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.

Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts. Set screw pressure point type hardware shall not be used.

The InsertValve shall be a Team InsertValve Patent number 6,776,187 and 7,225,827 or written approved equal.”

In addition to the modification to the Technical Specifications noted above the following sections form part of the Contract Documents and are necessary for the Project.

1. Demolition

All demolished and removed material shall become the property of the Contractor unless specified otherwise. The Contractor shall dispose of removed material in a lawful manner. The storage or disposal of removed items on the site will not be allowed. Disposal costs shall be included in the Bid prices.

The Contractor shall exercise due concern for utility system operation during and following construction and shall diligently direct all activities toward minimizing water service outage durations and resident inconvenience.

2. Temporary Water Bypass

Refer to 01 15 00, *Construction Facilities and Temporary Controls*, for set up of temporary water service, Temporary water service bypass system should conform to the specifications listed in 02510, *Water Distribution*, specifically for sanitation of water lines used in bypass, and testing requirements.

All materials furnished for use as temporary bypass pipe, service hose, connections and related appurtenances that come into contact with drinking water are to be certified for conformance with American National Standards Institute/National Sanitation Foundation Standard 61 (ANSI/NSF Standard 61) by an American National Standards Institute (ANSI) approved third-party certification program or laboratory. All materials shall be fully adequate to withstand the required water pressure and all other conditions of use, and shall provide adequate water tightness before being put into service.

Temporary bypass pipe must be drawn from water main equipment stocks that are dedicated exclusively for use in pipe projects involving fresh potable water.

Temporary bypass pipe shall be HDPE having a minimum working pressure rating of 200 pounds per square inch with restrained couplings.

SECTION 01 19 00 – SPECIAL PROJECT PROVISIONS

END OF SECTION 01 19 00

SECTION 2 – STANDARD SPECIFICATIONS

02275 - TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES

(Last revised 1/1/2025)

SUGGESTED SEARCH WORDS FOR THIS SECTION

Part 1-- General	Common Trench Backfill	Minimum Pipe Cover
Part 2 – Products	Compaction – Min Requirements	Pavement Repair
Part 3 – Execution	Initial Backfill Backfill	River & Creek Crossings
Backfilling	Detectable Warning Tape/Wire	Rock Excavation
Bedding Definitions	Dewatering	Seeding & Groundcover
Bedding for Pipe	Erosion Control, NPDES	Select Earth Backfill
Blasting	Flowable Fill Concrete	Trench Backfilling
Cleanup & Restoration	Foundation Preparation	Unclassified Trench Excavation
Clearing and Grubbing	Highway Crossings	

PART 1 – GENERAL

1.1 GENERAL

The Contractor shall furnish all labor, materials, tools, equipment, and perform all work and services necessary for or incidental to the furnishing and installation, complete, of all operations in connection with excavation, trenching, and backfilling of underground utilities as shown on drawings and as specified, in accordance with provisions of the Contract Documents, and completely coordinated with work of all other trades.

Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation.

Work included in the project consists of, but is not necessarily limited to, methods of installation of the following:

- Sanitary Sewer Pipe Installation & appurtenances.
- Water Distribution Pipe Installation & appurtenances.
- Reclaimed Water Pipe Installation & appurtenances.
- Relocation of piping systems.

1.2 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.

Section 02510– WATER DISTRIBUTION.

Section 02520—RECLAIMED WATER.

Section 02530 – SANITARY SEWER.

1.3 SUMMARY

This section includes:

- Excavating and backfilling trenches for buried water and sewer, buried utility structures, and appurtenances.
- Preparing subgrade for buried water and sewer, buried utility structures, and appurtenances.

1.4 DEFINITIONS

For the purposes of this specification, the following definitions refer to sanitary sewer and water distribution systems that come under the authority of OWASA as specified within this section and other sections of this manual.

A. BACKFILL

Soil materials used to **support the pipe and** fill an excavated trench:

1. **Initial Backfill** (Carefully Compacted Select Earth Backfill): Backfill placed beside and over the top 12-inches of the pipe in a trench, **and above the top of the bell ends**, including haunches to support sides of pipe.
2. **Final Backfill** (Common Trench Backfill): Backfill placed over the initial backfill **and to the final grade** to fill a trench.

B. BEDDING COURSE

Layer of clean coarse stone placed over the excavated subgrade **or Foundation Stone** in a trench before laying pipe **to provide uniform support and cushioning for the pipe**.

C. FOUNDATION STONE

Clean well-graded stone, authorized by OWASA's Engineer, used to strengthen and/or provide support to an otherwise weak subgrade. Foundation stone is placed, and the subgrade improved before bedding stone is placed. **Foundation stone shall be required when soil conditions are unsuitable.**

D. ROCK EXCAVATION

Removal and satisfactory disposal of all unsuitable materials, which, in the opinion of OWASA's Engineer, cannot be excavated except by drilling, blasting, wedging, jack hammering or hoe ramming. It shall consist of undecomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than ½ cubic yard and/or solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling and blasting, will be classified as rock.

E. 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.

F. SUBGRADE

Surface or elevation remaining after completing the trench excavation or, the top surface of a backfill (stone or soil) immediately below the pipe conduit or pipe bedding, as applicable.

G. TRENCH BORROW

Trench borrow shall consist of approved material imported from off-site for use as fill or backfill required to be placed in trenches either as initial carefully controlled select earth backfill or final common trench backfill. Trench borrow shall trench, unless authorized by OWASA's Engineer.

H. UNCLASSIFIED EXCAVATION

Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.

I. UNDERCUT EXCAVATION

Undercut excavation shall consist of the removal and satisfactory disposal of all unsuitable material located below subgrade elevation. Where excavation to the finished grade section results in a subgrade or slopes of muck, peat, matted roots, etc., the Contractor shall remove such material below the grade shown on the plans or as directed; and areas so excavated shall be backfilled with approved select earth trench borrow or stone as ordered by OWASA's Engineer.

J. INDUSTRY ABBREVIATIONS FOR PIPE MATERIALS

AC:	Asbestos Cement Pipe
DIP:	Ductile Iron Pipe
HDPE:	High Density Polyethylene Pipe
PVC:	Polyvinyl Chloride Plastic Pipe
RCP:	Reinforced Concrete Pipe

1.5 SUBMITTALS

A. PRODUCT DATA AND SAMPLES

Submit product data and a sample of drainage fabric or separation fabric and fully document each with specific location or stationing information, date, and other pertinent information.

B. MATERIAL TEST REPORTS

Provided from a qualified testing agency which either indicate or interpret test results for compliance of the following requirements indicated:

- 1) Classification according ASTM D2487 of each on-site or borrow soil proposed for backfill, unless otherwise directed by OWASA's Engineer.
- 2) Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for backfill.

C. BLASTING

- 1) Insurance Certificate naming OWASA's Engineer as "additional Insured." See paragraph 3.8.A – *Blasting* for other blasting insurance requirements.
- 2) Qualifications, proposed procedures, and schedule shall be submitted at least 2 weeks prior to commencing any blasting operations.
- 3) Permits from local Fire Department and Town officials.
- 4) Blasters shall, at all times, have their license and blasting permits on the job site, and shall allow examination of same by any official that may have jurisdiction.
- 5) If required by OWASA's Engineer, seismic survey agency report, for record purposes.

D. BURY DEPTH COMPUTATIONS

Computations justifying pipe bury when bury depth exceeds the allowable depth shown in this specification. Provide method, applicable charts/graphs, printouts, assumptions, etc. used in justifying the adequacy of the pipe to withstand the loads imposed by the excessive depth.

E. PRODUCT DATA

- 1) Each type of plastic warning tape
- 2) Stabilization/Separation fabric
- 3) Drainage Fabric

1.6 QUALITY ASSURANCE

A. GEOTECHNICAL TESTING AGENCY QUALIFICATIONS

An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock-definition testing as documented according to ASTM D3740.

B. JURISDICTIONAL AUTHORITIES

Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.

C. STANDARDS

- 1) The contractor shall comply with North Carolina Department of Environmental Quality, "Erosion and Sedimentation Control Handbook," latest revision.

- 2) Comply with applicable requirements of NFPA 495, *“Explosive Materials Code.”*
- 3) *“Gravity Sanitary Sewer Design and Construction,”* ASCE Manuals and Reports on Engineering Practice – NO. 60, WEF Manual of Practice NO. FD-5.
- 4) Comply with Uni-Bell PVC Pipe Association *“Handbook of PVC Pipe: Design and Construction,”* 4th Ed. Dallas: UNI, August 2001 for the installation of PVC piping.

1.7 QUALITY STANDARDS

Materials and operations shall comply with the latest revision of the Codes and Standards listed below. Additional Reference Standards in Section Introduction 1.5.

American Society for Testing and Materials

ASTM C33	<i>Standard Specification for Concrete Aggregates</i>
ASTM D698	<i>Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (Standard Proctor).</i>
ASTM D1556	<i>Standard Method of Test for Density of Soil in Place by the Sand-Cone Method</i>
ASTM D1557	<i>Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (Modified Proctor).</i>
ASTM D1784	<i>Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds. [Active. 2020]</i>
ASTM D2122	<i>Standard Method of Determining Dimensions of Thermoplastic Pipe and Fittings.</i>
ASTM D2167	<i>Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method</i>
ASTM D2321	<i>Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications.</i>
ASTM D2487	<i>Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).</i>
ASTM D2665	<i>Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.</i>
ASTM D2937	<i>Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method</i>
ASTM D3034	<i>Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.</i>
ASTM D3139	<i>Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.</i>

ASTM D3212	<i>Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.</i>
ASTM D4253	<i>Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.</i>
ASTM D4254	<i>Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.</i>
ASTM D4318	<i>Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.</i>
ASTM D6938	<i>Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).</i>
ASTM F477	<i>Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.</i>
ASTM F679	<i>Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.</i>
ASTM F794	<i>Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.</i>
ASTM F1336	<i>Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings.</i>
ASTM F1417	<i>Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.</i>

American Association of State Highway & Transportation Officials

AASHTO T99	<i>Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.</i>
AASHTO M145	<i>Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.</i>
AASHTO T180	<i>Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop</i>
AASHTO T191	<i>Density of Soil In-Place by the Sand-Cone Method</i>
AASHTO T204	<i>Density of Soil In-Place by the Drive Cylinder Method</i>
AASHTO T205	<i>Density of Soil in Place by the Rubber-Balloon Method</i>

American Water Works Association

AWWA C600	<i>Installation of Ductile-Iron Mains and Their Appurtenances</i>

AWWA C605 *Standard for Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings*

AWWA C800 *Underground Service Line Valves and Fittings*

AWWA M23 *PVC Pipe Design and Installation*

Uni-Bell PVC Pipe Assoc.

UNI-B-6 *Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe*

UNI-PUB-6 *Installation Guide for PVC Solid Wall Sewer Pipe (4-48 in.)*

UNI-TR-3 *Maintenance of PVC Sewer Pipe*

Handbook of PVC Pipe Design and Construction

Also (<https://www.uni-bell.org/Portals/0/ResourceFile/installation-guide-for-solid-wall-pvc-sewer-pipe.pdf>)

Other

ANSI American National Standards Institute

ARMEA American Railway Engineering and Maintenance-Of-Way Assoc.

DIPRA *Ductile Iron Pipe Association*

NCDWR North Carolina Division of Water Resources

NCDEQ NC Department of Environmental Quality

NCDOT North Carolina Department of Transportation

NPDES National Pollutant Discharge Elimination System

OSHA Occupational Safety and Health Administration

SDS Safety Data Sheet

1.8 TESTING SERVICES

A. TESTING LABORATORY

The Testing Laboratory (selected by the Contractor) shall be approved by OWASA's Engineer and will be responsible for conducting and interpreting tests. The Testing Laboratory shall state in each report whether or not the test specimens conform to all requirement of the Contract Documents and specifically note any deviation there from.

B. TEST AND INSPECTION REQUIREMENTS

Specific test and inspection requirements shall be as specified herein.

1.9 PROJECT CONDITIONS

A. DEMOLITION

Demolish and completely remove from the site existing underground utilities indicated on the plans to be removed.

B. ENVIRONMENTAL – WETLANDS

Before crossing or entering into any jurisdictional wetlands, contractor shall verify whether or not a wetlands permit has been obtained for the encroachment and whether special restrictions have been imposed. Care shall be taken to prevent draining or otherwise destroying non-permitted wetlands. Restore as stated on either the project drawings, the contract documents, and/or as noted in the permit.

C. ENVIRONMENTAL - BUFFER CROSSING REQUIREMENTS

Before crossing streams or ditches or working within 50 feet of ponds, lakes, or rivers, the Contractor shall verify whether either the line is exempt or a permit has been obtained to encroach into a nutrient sensitive river basin buffer and if so, to what extent work is permitted to occur. Unless otherwise permitted, shown on the contract drawings, or exempted, water and sewer crossing stream, river, pond, or lake buffers are to be as near perpendicular as possible (the crossing is considered to be perpendicular if it intersects the stream or surface water between an angle of 75 and 105 degrees). Do not disturb more than 40 linear feet (longitudinal) of riparian buffer. When permitted to encroach into zone 1 (the lower 30 feet beside the stream or water), adhere to all of the following Best Management Practices in during construction.

- 1) Woody vegetation is cleared by hand. No grading allowed.
- 2) Stumps to remain except in trench where trees are cut. Minimize disturbance to roots in buffer zone.
- 3) Backfill trench with the excavated soil immediately following installation.
- 4) Do not use fertilizer except for the one-time application to reestablish vegetation.
- 5) Minimize removal of woody vegetation, the amount of disturbed area, and the time the disturbed area remains disturbed.
- 6) Take measures to ensure diffuse flow of water through the buffer after construction.
- 7) In wetland areas, use mats to minimize soil disturbance.

D. SAFETY

The Contractor shall keep the surface over and along the trenches and other excavation in a safe a satisfactory condition during the progress of the work.

1.10 LOCATING SERVICES

Contact OWASA Distribution and Collection Systems Division to coordinate interruption of service, operation of valves, line cut-ins, or placement of a tapping sleeve and valve. If interruption is necessary, the interruption shall be arranged to occur at such a time to

cause the least disruption and minimize loss of service. At the direction of OWASA's Engineer, temporary service may be required to be provided. Provide a minimum of 10 working days' notice of the proposed utility interruption or necessary operation of valves.

1.11 COORDINATION

A. OWASA OPERATES VALES AND HYDRANTS

Coordinate tie-in to municipal water mains with OWASA's Engineer. OWASA will be the sole operator of all valves and hydrants on the OWASA water distribution system. Do not interrupt existing utilities or shut off valves of active lines unless approved by OWASA's Engineer. If interruption is necessary, the interruption shall be arranged to occur at such a time to cause the least disruption and minimize loss of service.

B. TIE-IN TO SEWER MAIN AND MANHOLES

Coordinate tie-in to sewer mains and manholes with OWASA's Engineer.

C. BYPASS PUMPING

At the direction of OWASA's Engineer, temporary pumping/bypass of sewerage flow may be required to be provided. See Section 02530 - *Sanitary Sewer, Bypass Pumping* for bypass pumping requirements and procedure.

D. TRAFFIC SIGNALS

When traffic signals, loops, or their appurtenances are likely to be damaged or interfere as a result of the construction, coordinate temporary operation with the applicable agency having jurisdiction of the signals. Provide a minimum of 48-hour notice prior to anticipated disturbance or interruption.

E. CALL BEFORE YOU DIG

Contact **"NC One Call"** 1-800-632.4949 or The National "Call Before You Dig" 811 before digging.

1.12 PUBLIC CONVENIENCE

The Contractor shall at all times so conduct their work as to ensure the least possible inconvenience to the general public and the residents in the vicinity of the work. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to ensure the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed except as approved by OWASA's Engineer.

1.13 EROSION AND SEDIMENTATION CONTROL AND NPDES MONITORING, CONTROLS, AND LIMITATIONS FOR PERMITTED DISCHARGES

The Project Engineer shall submit a sedimentation and erosion control plan to the appropriate authority and obtain all necessary construction permits. The Contractor shall follow all local and state requirements regarding sedimentation and erosion control. Construction methods shall minimize sedimentation and erosion.

It is the Contractor's responsibility to periodically monitor the Stormwater Discharge Outfall points at the specified frequency and maintain reports as outlined in these specifications.

A. FINAL LIMITATIONS AND CONTROLS FOR STORMWATER DISCHARGES

During the period beginning on the effective date of the permit and lasting until expiration, the Owner (Permittee) is allowed and authorized to discharge stormwater associated with construction activity. Such discharges shall be controlled, limited, and monitored as specified below.

- 1) The Contractor shall implement the Erosion & Sedimentation Control plan, which has been approved by the approval authority. The approved plan is considered a requirement or condition of the general NPDES permit. Deviation from the approved plan, or approved amendment to the plan, shall constitute a violation of the terms and conditions of this general permit except that deviation from the approved plan will be allowed:
 - a. To correct an emergency situation where sediments are being discharged off the site, or
 - b. When minor modifications have been made for the purpose of improving the performance of the erosion and sedimentation control measures and notification of the minor modification has been made to the Division of Energy, Minerals, and Land Resources (or approved local program).
- 2) Such a deviation from the approved plan shall be noted on the approved plan maintained at the job site. During active construction, a copy of the approved plan shall be maintained on the site.
- 3) Equipment utilized during the construction activity on a site must be operated and maintained in such a manner as to prevent the potential or actual pollution of the surface or ground waters of the state. Fuels, lubricants, coolants, and hydraulic fluids, or any other petroleum products, shall not be discharged onto the ground or into surface waters. Spent fluids shall be disposed of in a manner so as not to enter the waters, surface, or ground, of the state and in accordance with applicable state and federal disposal regulations. Any spilled fluids shall be cleaned up to the extent practicable and disposed of in a manner so as not to allow their entry into the waters, surface or ground, of the state.
- 4) Herbicide, pesticide, and fertilizer usage during the construction activity shall be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act and shall be in accordance with label restrictions.
- 5) All wastes composed of building materials shall be disposed of in accordance with North Carolina General Statutes, Chapter 130A, Article 9 – Solid Waste Management, and rules governing the disposal of solid waste (North Carolina Administrative Code Section 15A NCAC 13B).
- 6) The Contractor, for the Permittee, shall control the management and disposal of litter and sanitary waste from the site such that no adverse impacts to water quality occur.

B. MINIMUM MONITORING AND REPORTING REQUIREMENTS

Minimum monitoring and reporting requirements are as follows unless otherwise approved in writing by the Director of the Division of Water Resources.

- 1) All erosion and sedimentation control facilities shall be inspected by or under the direction of the permittee (the Owner). However, the responsibility for inspection is herein delegated by the Owner to the Contractor as part of this project. Inspections shall be made:
 - a. At least once every seven calendar days (at least twice every seven days for those facilities discharging to waters of the State listed on the latest EPA approved 303(d) list¹ for construction related indicators of impairment such as turbidity or sedimentation), and
 - b. Within 24 hours after any storm event of greater than 0.5 inches of rain per 24-hour period.

A rain gauge shall be maintained on the site by the Contractor and a record of the rainfall amounts and dates shall be kept by the Contractor.
- 2) Once land disturbance has begun on the site, stormwater runoff discharges shall be inspected by observation for stormwater discharge characteristics as defined below at the frequency in stated above to evaluate the effectiveness of the pollution control facilities or practices. If any visible sedimentation is leaving the disturbed limits of the site, corrective action shall be taken immediately to control the discharge of sediments outside the disturbed limits.

Stormwater Discharge Characteristics	Monitoring Type ¹	Monitoring Location ²
Clarity	By observation	SDO
Floating Solids	By observation	SDO
Suspended Solids	By observation	SDO
Oil Sheen	By observation	SDO
Other obvious indicators of stormwater pollution	By observation	SDO

Footnotes:

¹ Monitoring Type: The monitoring requires a qualitative observation of each stormwater outfall. **No analytical testing or sampling is required.**

² Sample (observation) location: **SDO= Stormwater Discharge Outfall**

- 3) The operator (Contractor) shall keep a record of inspections and forward copies of these reports to OWASA's Engineer. Visible sedimentation found outside of the disturbed limits shall be recorded and a brief explanation kept with the records as to the measures taken to control future releases. Any measures taken to clean up

¹ The latest approved list may be obtained from the Division of Water Resources, or from the following website location: <https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment/water-quality-data-assessment/integrated-report-files>.

the sediment that has left the disturbed limits shall also be recorded. These records shall also be made available to NCDWR or an authorized agent upon request. If OWASA's Engineer discovers sedimentation outside the limits of disturbance, the Contractor will be notified in writing and requested to remediate the situation.

- 4) All records of monitoring shall be turned over to OWASA along with the "red lined" record water and/or sewer drawings.

C. SCHEDULE OF COMPLIANCE

- 1) The Contractor shall comply with Final Limitations and Controls specified for stormwater discharges once disturbance has begun on the site and until completion of construction or development and the establishment of a permanent ground cover.
- 2) During construction and until the completion of a construction or development and the establishment of a permanent ground cover, the Contractor shall provide the operation and maintenance necessary to operate the stormwater controls at optimum efficiency.

PART 2 – PRODUCTS

2.1 SOIL, BEDDING AND BACKFILL

A. MATERIAL CLASSIFICATION

- 1) **Bedding Material:** #57 or #67 stone (NCDOT Standard Specifications for Roads and Structures, Table 1005-1). **In poor soils, or when the foundation is determined by OWASA to be unsuitable, improve foundation in accordance with Paragraph 3.2 F.**
- 2) **Excavation:** All excavation material shall be classified as either Rock or Unclassified Earth Excavation.
- 3) **Flowable Fill Concrete Backfill**

- a. Non-excavatable flowable fill concrete shall have a minimum 28-day compressive strength of 125 psi but no more than 200 psi (to be excavatable by machine equipment). Materials shall comply with the recommendations within ACI 229, latest revision, which include cement, aggregates, fly ash, water, admixtures, slag and other non-standard materials).

Excavatable is an application where it may be necessary to remove the flowable fill at a later date. Non-excavatable is an application where it is not necessary to remove or otherwise excavate the flowable fill at a later date.

- b. Flowable Fill Concrete for Pipe Abandonment Controlled Low Strength Material. Concrete strength shall be liquid enough to flow, be self-leveling,

excavatable, and have a minimum 56-day compressive strength of 50 psi but not more than 150 psi.

- 4) **Foundation Stone:** Foundation/Trench Stabilization Material: #57 or #67 stone.
- 5) **Select Earth Backfill** shall be free of debris, roots, frozen materials, organic matter, rock, or gravel larger than 1 inch in any dimension, or other harmful matter and shall generally meet NCDOT *Standard Specifications for Roads and Structures*, Section 1016 – Select Material for properties and gradation. The suitability of material shall be determined by a geotechnical engineer and approved by OWASA's Engineer, however at its sole discretion, OWASA may require select, import fill to be used, such as when DI pipe is installed in corrosive soils.
- 6) **Common Trench Backfill:** Suitable material from the specific excavation may be used for final backfill provided the material meets the following criteria. The suitability of material for specific purposes shall be determined by a geotechnical engineer and approved by OWASA's Engineer.
 - a. **Satisfactory Soils:** ASTM D2487 (Unified Soil Classification System)(USCS), soil classification groups GW, GP, GM, SW, SM, SC, ML, and CL; or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste frozen materials, vegetation, and other deleterious matter.
 - b. **Unsatisfactory Soils:** ASTM D2487 USCS soil classification groups GC, CH, MH, OH, OL and PT; soils which contain rock, gravel, or clumps of clay larger than 3 inches in any dimension, debris, waste frozen materials, vegetation, perishable and objectionable materials (organic), and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction, unless otherwise approved by either OWASA's Engineer or a Geotechnical Engineer.
- 7) **Structures, Backfill Around:** Backfill shall be approved by OWASA's Engineer and shall be free from large or frozen lumps, wood, or rocks more than 3 inches in their greatest dimension or other extraneous material. Porous backfill shall be either #67 or #57 clean stone.
- 8) **Topsoil:** Topsoil shall consist of friable clayey or silty loam, free from roots, stones, and other undesirable material and shall be capable of supporting a good growth of grass. Topsoil shall be free of material greater than 1-inch in any dimension.

2.2 MISCELLANEOUS

A. GEOTEXTILE FABRIC

Geotextile fabric shall be protected from mud, dirt, dust, sunlight, and debris during transport and storage. Material shall be inert to commonly encountered chemicals; resistant to mildew, rot, insects, and rodents; and biologically and thermally stable. Geotextile fabric for subsurface installation shall not be exposed to direct sunlight for more than 24 hours before or during installation.

Nonwoven geotextile, specifically manufactured as a drainage fabric; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D4759 and referenced test methods:

1) Drainage Fabric

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D4751	Equal to or greater than No. 30 sieve
Permittivity	ASTM D4491	Minimum 0.51 sec.
Tensile strength @ 20% (max) elongation	VT<52	Minimum 25 in-lbs/lin

2) Geotextile for use with Rip-Rap

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D4751	Equal to or greater than No. 50 sieve
Puncture Strength	ASTM D751	Minimum 80 lb.
Tensile strength @ 20% (max) elongation	VT<52	Minimum 30 in-lbs/lin

Seams shall be equal in strength to the basic material.

Additional fabric material or noncorrosive steel wire may be incorporated into fabric to increase overall strength.

3) Separation Fabric

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D4751	Equal to or greater than No. 30 sieve
Puncture Strength	ASTM D 4833	90 lbf
Grab Tensile strength	ASTM D 4632	Minimum 200 lbf
Water Flow Rate	ASTM D 4491	4 gpm per sq. ft.

4) Stabilization Fabric

Provide fabric meeting Geotechnical Engineer's recommendations for the application intended.

B. DEFORMED REINFORCING STEEL

Reinforcing Steel bars shall meet ASTM A615, grade 60, latest revision.

C. WELDED WIRE FABRIC

Welded wire fabric shall meet ASTM A1064, latest revision.

D. TRACER TAPE AND TRACER WIRE

a) **Metallic Underground Warning Tape:** Metallic detectable underground warning tape shall consist of a solid aluminum foil core, 35 gauge minimum, encased on each side with plastic (minimum overall thickness 5.0 mils) and be 3 inches wide with black lettering imprinted on a color-coded background that conforms to APWA uniform color code specification (BLUE for water, GREEN for sewer and PURPLE for reclaimed water) and silver with black ink letters. Minimum tensile strength shall be 22 lbs/inch. Soil tolerance range to be pH 2.5 to pH 11.0. On one side of the tape, the text shall include the wording "WATER LINE BELOW," "SEWER LINE BELOW," or "RECLAIMED WATER LINE BELOW" as appropriate, repeated along the length of the tape.

b) **Tracer Wire:** Tracer wire shall be as manufactured by Copperhead Industries, LLC. 12 AWG Superflex expanded wire or approved equal **for open cut and SoloShot Extra-High Strength CCS or approved equal for directional bores and** shall be installed above all mains and services. The wire color shall be appropriate for the utility being installed. Blue for potable water, green for sewer, and purple for reclaimed water. **Water and corrosion proof connectors, such as 3M direct bury splice kits, Copperhead Snakebite Locking Connectors, or approved equal, shall be used when splicing wire together.**

Placement of tracer tape and tracer wire shall be installed per Paragraph 3.16B, *Identification of New Water or Sewer Lines* of this Section.

PART 3 – EXECUTION**3.1 PREPARATION****A. GENERAL REQUIREMENTS APPLYING TO ALL AREAS**

- 1) Contractor shall plan construction to minimize disturbance to properties adjacent to the water or sewer lines.
- 2) OWASA's Engineer reserves the right to limit the width of land to be disturbed and to designate on the drawings or in the field certain areas or items within this width to be protected from damage.
- 3) **Access and/or Haul Roads:** Any grading or excavation required for equipment travel during the course of construction as well as erosion control, access or haul road removal, restoration, seeding and ground cover shall be provided by the Contractor.

- 4) The contractor shall be responsible for damage to areas or items designated by OWASA's Engineer **or outside of the construction limits** to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made to the satisfaction of OWASA's Engineer before acceptance of the completed project.
- 5) The Contractor shall protect all buildings or structures located along the utility line. Hand trenching, shoring, or other methods may be required.
- 6) Any fences disturbed by the Contractor shall be repaired with new materials to a condition equal to or better than their original condition or to the satisfaction of OWASA's Engineer.
- 7) Contractor shall limit width of disturbed area through garden areas to a width absolutely necessary for construction of utility line.
- 8) Contractor shall obtain written permission from property owners for use of any access other than ones located within public rights-of-way or easements. Written permission shall contain conditions for use and restoration agreements between property owner and Contractor.
- 9) All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- 10) The Contractor shall replace or repair all damaged or destroyed hedgerows and property corners using the services of a licensed Professional Surveyor.

B. CONSTRUCTION LIMITS

- 1) Contractor shall not disturb any areas outside the limits contained in this section without express written permission from OWASA's Engineer.
- 2) Except as indicated on the plans, no "clear cutting" of timber shall be permitted within the construction limits. Contractor shall make select cutting of trees, taking smallest trees first, that are mandatory for the construction of the utility line. The decision of OWASA's Engineer shall be final on the determination of which trees are to be cut.
- 3) The widths measured from the centerline of the water or sewer lines shall be as shown on the contract drawings. The Contractor shall protect all areas outside these construction limits unless written variations are granted by OWASA's Engineer.
- 4) **Specific Requirements Applying to Developed Subdivision/Lots**
 - a. All trees located beyond 15 feet of the centerline of water or sewer line shall be protected by the Contractor. OWASA's Engineer reserves the right to designate other trees located closer to the centerline for protection where possible.
 - b. All shrubs, hedges, or other ornamental plantings located along the line shall be protected or removed and replanted by the Contractor.

- c. The Contractor shall protect septic systems or springs located beyond 15 feet from the centerline of the line.
- d. Contractor shall grub only brush, roots, and stumps of removed trees. Damage to lawns shall be kept to an absolute minimum necessary for construction.
- e. Excavated or blasted rock shall be removed from the site unless otherwise ordered by OWASA's Engineer.
- f. Restoration and fine grading shall follow within 15 calendar days from the time an area is disturbed or within 1000 feet from the immediate work site, whichever occurs first. Seeding shall follow as ordered by OWASA's Engineer.

5) **Specific Requirements Applying to Undeveloped Areas**

- a. In wooded areas, the clearing shall be 15 feet on each side of pipe, unless indicated differently on the OWASA approved construction drawings, in which case, the work shall be confined to the limits defined on the plans. All permanent easements shall be fully cleared. All trees 12 inches in diameter or larger located beyond 15 feet of the centerline of the water or sewer line shall be protected unless Contractor obtains written authorization from OWASA's Engineer to remove them. OWASA's Engineer reserves the right to designate select trees located closer to the centerline for protection where possible.
- b. In areas where livestock is kept, the Contractor shall notify property owner prior to commencing work and keep owner advised of progress of work. Fences shall be kept secure at all times and livestock protected from open ditches, machinery, blasting, and other hazards.
- c. Restoration, fine grading, and permanent seeding shall follow within 15 working days or 30 calendar days, whichever is shorter, from the time an area is disturbed or within 1000 feet from the immediate work site, whichever occurs first. See paragraph 3.15 – *Seeding and Groundcover*.

C. CLEARING AND GRUBBING

- 1) **Description:** This work shall consist of clearing, grubbing, removing, and disposing of all vegetation and debris within the limits of construction, as designated on the plans or as required by OWASA's Engineer. The work shall also include the preservation from injury or defacement of all vegetation or objects designated to remain. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, down timber, brush, rocks, projected roots, stumps, rubbish, laps, and other material within easement.
- 2) A preconstruction meeting shall be held with appropriate urban forestry personnel from the Town of Chapel Hill or Town of Carrboro prior to any clearing. Tree protection fencing shall be installed, and all tree ordinances shall be followed.
- 3) The Contractor shall provide barricades, fences, coverings, or other types of protection necessary to prevent damage to existing improvements, not indicated to be removed, and improvements on adjoining property. All improvements damaged by this work shall be restored to their original condition to a condition acceptable to the owner or other parties or authorities having jurisdiction. Trees

and shrubs that are to remain within the construction limits will be indicated on the drawings or conspicuously marked on site. Unless otherwise noted, trees within the construction limits shall become the property of the Contractor and shall be removed from the site.

- 4) Contractor shall protect existing trees and other vegetation indicated by OWASA's Engineer to remain in place against limb, bark or root damage such as cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. When such damage does occur, all rough edges of scarred areas shall be removed in accordance with accepted horticultural practices.
- 5) Carefully and cleanly cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of the utility line. If directed by OWASA's Engineer, the Contractor shall provide protection for roots and branches over 1 ½ inches diameter that are cut during construction operations. Coat the cut faces with emulsified asphalt, or other coating especially formulated for horticultural use on cut or damaged plant tissues. Temporarily cover all exposed roots with wet burlap to prevent roots from drying out. Provide earth cover as soon as possible.
- 6) Trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to OWASA's Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified tree surgeon.
- 7) Debris from the site shall be removed in such a manner as to prevent spillage. Keep pavement and area adjacent to site clean and free from mud, dirt, dust, and debris at all times.
- 8) The method of stripping, clearing, and grubbing the site shall be at the discretion of the Contractor. However, all stumps, roots and other debris protruding through the ground surface or in excavated areas shall be completely removed and disposed of off the site by the Contractor.
- 9) **Stripping of Topsoil:** Remove the existing topsoil to a depth of 6 inches or to the depth encountered from all areas in which excavation will occur. The topsoil shall either be stored in stockpiles separate from the excavated trench material if the topsoil is to be re-spread or otherwise disposed of off-site. Topsoil stockpiles shall be graded to freely drain surface water and shall have a silt fence placed around the base of the stockpile.
- 10) **Disposal:** All brush, tree tops, stumps, and debris shall be hauled away from site or otherwise disposed of in a manner acceptable to OWASA's Engineer. The Contractor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes their property and is not to be reused in construction. Sale of material on the site is prohibited.

Disposal of cleared material shall be in accordance with all local and state laws. Trees cut down on the construction site will be hauled away from the site for proper disposal unless instructed otherwise by OWASA. Stumps of trees cut down

outside of the excavation area will be removed. Perishable material shall not be disposed of at the construction site. Brush, laps, roots, and stumps from trees shall be disposed of in an NCDEQ approved and permitted land clearing and inert debris type landfill. The Contractor will be responsible for obtaining all applicable permits and paying all fees for the disposal of excess material.

D. PROTECTION OF EXISTING UTILITIES AND STRUCTURES

1) **Subsurface Obstructions**

- a. **Subsurface Obstructions:** Take necessary precautions to protect existing utilities from damage due to any construction activity. The contractor shall locate existing utilities, culverts, and structures (above or below ground), before any excavation starts and coordinate work with utility companies. The Contractor shall be responsible for notifying utility companies when working within the vicinity of the existing utilities. Omission from or inclusion of located utility items on plans do not constitute non-existent or definite location. Even though for convenience, the utility may be shown on the plans, the Contractor is responsible for and shall call for utility location a minimum of 3 business days prior to excavations. Contact underground damage protection services NC One Call at 1.800.632.4949. Secure and examine local utility surveyor records for available location data including building service lines.
- b. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. In excavating, care must be taken not to remove or injure any subsurface structure. All existing gas pipes, water pipes, steam pipes, telephone lines, cable TV lines, electrical conduits, sewers, drains, fire hydrants, and other structures which, in the opinion of the utility company, do not require relocation shall be carefully supported, shored up, the flow maintained, if applicable, and the line/main protected from damage by the Contractor. If damaged, the contractor shall give immediate notice to the proper authorities. The utility shall be restored, at the Contractor's expense, by the appropriate utility to original or better condition. Where pipes, conduits, or sewers are removed from the trench leaving dead ends in the ground, such ends shall be carefully plugged or bulkheaded by the Contractor at the Contractor's expense. The Contractor shall be responsible for any damage to persons or property caused by such breaks.
- c. The Contractor shall be responsible for anticipating and locating underground utilities and obstructions. When construction appears to be in close proximity to existing utilities, the trench(es) shall be opened a sufficient distance ahead of the work or test pits made to verify the exact locations and inverts of the utility to allow for changes in line and grade.
- d. If active utility lines are encountered and are not shown on the Drawings or otherwise known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
- e. If permanent facilities being constructed under this Section are found to interfere with or encroach on the existing utilities, immediately notify OWASA's Engineer and secure their instructions.

- f. Do not proceed with permanent relocation of utilities until written instructions are received from OWASA's Engineer.

2) **Protection of Surface Features**

- a. Whenever the utility line is to be placed in or near a paved street, the Contractor shall provide pads or take necessary precautions to protect the pavement from damage by the construction equipment. Pavement damaged by cleated or tracked equipment, or by any other means, shall be repaired by the Contractor at their expense.
- b. Where a utility line is in an existing paved area, the Contractor shall use care to cut in sharp, neat lines ahead of the excavating/ditching equipment and parallel to the pipe on each side as may be applicable. If the existing road to be cut is located within either the Town of Carrboro or Town of Chapel Hill's corporate limits, the Contractor is responsible for contacting the Town Engineer or representative about pavement repair/replacement.
- c. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property.
- d. Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by OWASA's Engineer to prevent serious interruption of travel.
- e. Protect and maintain benchmarks, monuments, or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of OWASA's Engineer and the jurisdictional agency.

3) **Procedures for Repairing Damaged Utility Services**

- a. If a located service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to OWASA.
- b. **House Services:** If a service pipe supplying water or gas to an adjoining house is broken, the Contractor shall repair same at once and at their expense. OWASA may, at the Contractor's expense, repair any such service without prior notice to the Contractor.

E. **PROTECTION OF PERSONS AND PROPERTY**

- 1) Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or part of public access.
- 2) Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this or other related sections.

F. TRAFFIC CONTROL

- 1) When working within the OWASA service area, conform to the *Manual on Uniform Traffic Control Devices*, latest revision (MUTCD) as well as the NCDOT Standard Specifications for Roads and Structures, latest revision.
- 2) Traffic Maintenance shall comply with the latest revision of the NCDOT Standard Specifications for Roads and Structures, Division 9 – *Signing* and Division 11 – *Work Zone Traffic Control*, as well as other applicable sections.
- 3) When traffic signals or their appurtenances are likely to be damaged or interfere as a result of the construction, coordinate temporary operation with the NCDOT or the applicable Town's Traffic or Town Engineer. Provide 48-hour notice prior to anticipated disturbance or interruption.
- 4) Whenever it becomes necessary to leave a section of trench open after completion of the day's work, the Contractor shall provide barricades and lights to protect the public. Operate warning lights during hours from dusk to dawn each day and as otherwise required for inclement weather and visibility.

G. DEWATERING

- 1) **Water in Trenches:** When ground water that would affect the construction of the lines or their appurtenances is encountered, the contractor shall remove the water that accumulates in the trenches or pits by pumping, bailing, well-pointing, or other approved dewatering method and shall perform all work necessary to keep the trenches or pits entirely clear from water while bedding is being placed, the pipe is being laid, masonry units are being placed, and structures are either being set or constructed. All water removed from the trench shall be conveyed in a proper manner to a suitable point of discharge and shall comply with applicable erosion and sediment control laws.
- 2) No pipe shall be constructed in water and water shall not be allowed to drain through the pipe. The open end of the pipe shall be kept closed with a tight-fitting plug to prevent washing of any foreign matter into the line.
- 3) No structure shall be constructed in water and water shall not be allowed to flow over or rise upon any concrete masonry structure until the work has been accepted.
- 4) The Contractor shall dispose of water from the trenches in such a manner to cause no injury to public health, public or private property, work completed or in progress, street surfaces, or which may cause any interference with the use of the streets. Water, if odorless and stable, may be discharged into an existing storm drain, channel, or street gutter in a manner approved by OWASA's Engineer. When required by OWASA's Engineer, a means shall be provided for desilting (filtering) the water before discharge. Under no circumstances shall water be discharged to the sanitary sewer.
- 5) Prevent surface water from ponding on prepared subgrades and from flooding project site and the surrounding area. Reroute surface water runoff away from or around excavated areas.

- 6) Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- 7) Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
- 8) Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. Include cost of de-watering in bid for water or sewer lines. No additional remuneration for this item is permitted.
- 9) Where underground streams or springs are encountered, provide temporary drainage or bailing. Notify OWASA's Engineer of such conditions.

3.2 TRENCH EXCAVATION

A. GENERAL

- 1) **Classification of Excavated Material:** All excavated material shall be classified as either earth or rock. Prices bid for the various sizes of pipe shall include excavation and backfilling; such excavation shall be classified as earth.
- 2) Remove all material of whatever nature, including but not limited to clay, silt, and gravel. Material, of a compactable nature that can be re-used as trench backfill shall be replaced and re-compacted to the requirements set forth in these specifications.
- 3) **Unsuitable Material and Wasting:** When directed by the Owner's Engineer or OWASA's Engineer, unsuitable material in the trench shall be removed to an appropriate depth and width. At the Contractor's expense, dispose of all unsuitable material, of whatever nature, to a site which legally can accept such material as fill. Adhere to all applicable laws and ordinances regarding permitting of waste site, erosion control, zoning, etc. as may be applicable.
- 4) Excavation shall be performed in accordance with OSHA Standard 29 CFR Part 1926, OSHA Subpart P "Excavation and Trenching."
- 5) **Sewer Alignment and Grade:** Offset stakes set at each manhole shall indicate the line and grade of the sewer. Alignment and grade of the pipe by the Contractor shall be established by laser beam. The Contractor shall employ personnel experienced in the use of laser beams. The alignment and grade of the sewer shall be constructed as indicated on the approved plans. Prior to making changes in the field, OWASA's Engineer shall approve any change in grade or alignment which deviates from the approved plans.
- 6) Concrete collars shall be installed on lines with slopes 20% or greater. See Standard Detail 536.01.

B. PIPE COVER

- 1) **General:** Where lines transverse public property or are subject to other governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.
- 2) **Minimum and Maximum Cover:** Unless shown otherwise on the construction documents, provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item. Minimum **and maximum** cover on pipe are measured perpendicular from top of pipe or fittings to original ground or proposed finished grade as applicable and shall be per Table 02275.1, below. Where the minimum cover is not provided, either use Ductile Iron Pipe or encase the pipe(s) in concrete as indicated. Provide concrete with a minimum 28-day compressive strength of 3000 psi.
- 3) **Water mains:** Under conditions which otherwise prevent 42-inch bury, such as at crossings above shallow buried structures or rock, the minimum cover shall be 30 inches, as approved by OWASA's Engineer. Lines which have no more than 18 inches of cover at ditch or culvert crossings may be required by OWASA's Engineer to be encased in concrete for a length of 5 feet on each side the ditch or culvert or utilize a higher pressure class. Such encasements shall require approval of the OWASA Engineer.

Table 02275.1				
Minimum and Maximum Cover Above Top of Water and Sewer Pipes ^a				
Utility	Condition			
	<u>Minimum Cover</u> Subject to Vehicular Traffic?		<u>Maximum Cover</u>	Minimum Cover With Concrete Encasement
	<u>Yes</u>	<u>No</u>		
Sanitary Sewer/ Ductile Iron	36 inches	24 inches	18 feet	Case specific
Sanitary Sewer/ C900 PVC	36 inches	36 inches	12 feet	NA
Sewer Services	30 inches	12 inches	For gravity flow to main	Case specific
Water Distribution	42 inches	42 inches	72 inches	18 inches (encasement, if required, shall extend to at least 5 feet beyond each side of a ditch or culvert crossing)
Water Services	30 inches	30 inches	72 inches	As Designed

^aOWASA's Engineer must approve installation of all pipes that do not meet these requirements.

C. TRENCHING

- 1) **General:** The trench for gravity pipe shall be excavated to conform to Standard Detail 531.01, *Standard Sewer Bedding Detail*. Where it is necessary to remove existing pavements, prepared road surfaces, sidewalks and curbs, these structures/surfaces must be replaced by the Contractor. When making a pavement cut, the Contractor shall use care to saw cut in sharp, neat lines ahead of the excavating/ditching equipment and parallel to the pipe on each side as may be applicable.

All trenching shall be open cut from the surface. No tunneling or boring will be allowed without the consent of OWASA's Engineer. All trenches shall be excavated to the lines and grades as shown on the plans. Where utility lines are in an existing paved area, the edges of the pavement for the utility line shall be cut in a straight line, parallel to the pipe.

Trenches shall be excavated in straight lines, in general, following the contour of the ground, and shall be accurately graded in order to establish a true elevation of the invert of the pipe. Trenches for water lines may be curved within the limits of curvature of the pipe as allowed by AWWA C600. In no case shall the trench alignment exceed the allowable vertical or horizontal pipe deflection or offset recommended by the pipe manufacturer.

- 2) **Trench Width:** The sides of trench shall be uniform and vertical. The width of the trench at the top of the pipe shall be a width that will permit the proper construction of joints and compaction of backfill around the pipe and shall be equal to the largest outside diameter of the pipe plus 12 inches on each side of the pipe, measured at the top of the pipe. The sides of the trenches shall be vertical unless otherwise approved by OWASA's Engineer. Vertical walls should project at least 2 feet above the top of the pipeline laid to existing construction grade unless the finished grade fill depth is less than 2 feet. Lowering trench wall height may necessitate a change in either pipe or bury classification. Notwithstanding, this section is subject to OSHA guidelines and regulations regarding trench protection and shoring.

Every effort shall be made to maintain the width of the pipe plus 24 inches, but trench width must also be wide enough to provide adequate space for laying and connecting pipe and appurtenances, **and for compaction**. Sufficient space shall be allowed at the joints for the free use of wrenches for tightening of bolts.

The minimum trench width should generally be no less than 36 inches in order to accommodate a "Rammax" tamp.

In excavating for the trench, it is essential that the trench bottom be uniform in grade and remain static during backfilling and under all subsequent trench conditions. To ensure a uniform depth of stone, the grade of the bottom of the trench shall be graded to within 0.04 foot (1/2-inch) of the plan specified grade. The stone shall be graded to the same tolerance.

Care shall be taken not to over excavate the trench. All trenches excavated below grade (over excavated) shall be refilled to grade with clean #57 stone.

3) Trench Depth:

- a. **General:** All trenches shall be excavated to accommodate the bedding and backfill as shown in Standard Detail 531.01
 - b. **Water:** Trench depth shall generally conform to that shown on the plans and in conformity to the requirements of Table 02275.1, *Minimum and Maximum Cover Above Top of Main Pipe Lines*.
 - c. **Gravity Sewer:** Excavate to the depth and grades shown on the plans. Trench depth shall generally conform to the requirements of Table 02275.1, *Minimum and Maximum Cover Above Top of Main Pipe Lines*.
 - d. **Shaping Subgrade:** In excavating for the trench, it is essential that the trench bottom be uniform in grade and remains static during backfilling and under all subsequent trench conditions. To ensure a uniform depth of stone, the grade of the bottom of the trench shall be graded to within 0.04 foot (1/2-inch) of the plan specified grade. The stone shall be graded to the same tolerance.
 - e. **Zone of Influence for Building Foundations and Retaining Walls**
 - i. The outside bottom of a trench shall not pass through the zone of influence of a building foundation or retaining wall. Unless otherwise indicated by OWASA, the zone of influence is defined as a line extending down and out from the outside edge of a building or retaining wall footing at a 45-degree angle. For walls greater than 8 feet tall or with a surcharge load behind them, OWASA may require a Structural or Geotechnical Engineer review and approve any trench constructed within a horizontal distance of two times the trench depth from the face of the surcharge load. If either of these situations arise, contact the OWASA Engineer for direction before proceeding with trench excavation into these zones.
 - ii. Where shoring systems are proposed to be placed within the zone of influence, the surcharge loads imposed by the building or structure shall be taken into consideration by the shoring system designer.
- 4) **Open Trench Exposure:** Once trench is opened, proceed immediately and with dispatch to place specified materials in trench, or to otherwise utilize trench for intended purpose. Long stretches of open trench ahead of pipe laying shall be avoided. Excavating, pipe laying, and backfilling must move forward at approximately equal rates of progress. The Contractor shall only open as much ditch as they can completely install pipe, backfill, compact, and cleanup within that working day. The Contractor shall string out the pipe that can be installed in one day, and no more than 300 feet of trench shall be open in advance of the completed work in any section. There shall be no trenches left open without proper supervision during working hours or after work has been completed for day. Any exception to this construction practice must be approved, in writing, by OWASA's Engineer. Schedule work and order materials so that trenches are not left open for a longer period than is reasonably necessary. For OWASA contracts, if the Contractor should fail to heed the aforementioned requirement, OWASA's Engineer may refuse payment until these conditions are complied with.

- 5) **Containment of Sediment (solids and mud):** The Contractor shall at all times so conduct their work to ensure that all solids and mud are contained within the trench. This containment shall be by the employment of a brick or block weir at the junction of new construction and the existing OWASA system in order to trap material for the Contractor's removal and OWASA's inspection prior to acceptance. The installation and removal of this dam shall be at the Contractor's expense and shall be removed before the line is televised.

A. SHEETING AND BRACING, TRENCH BOXES

Trench walls may have vertical sides up to a maximum depth of 5 feet above subgrade elevation. Above this depth the entire side must be laid back or either shoring or a trench box, certified for the depths being used, must be used. The contractor shall be required to furnish, put in place, and maintain such sheeting, bracing, etc. as may be required to support the sides of the trenches. Brace and sheet trenches must be in full compliance with OSHA requirements.

Brace trenches running near walls or columns, to prevent any settlement or other disturbance of walls or columns.

Do not remove sheeting until backfilling has progressed to stage that no damage to piping, utility service, or conduit will result due to removal. All shoring and form material shall be removed before backfilling. For OWASA contracts, when sheeting, bracing, or trench boxes are required, in order to prevent damage to existing facilities or structures, or as a matter of safety, or as directed by OWASA's Engineer, the costs are to be included in the unit prices as bid for sanitary sewers, storm drains, water lines or structures as applicable and there shall be no additional cost for these items.

Sloping Trench Walls: If trench walls are to be sloped or benched, contractor is responsible for determining the proper and applicable slope based on soil type in order to meet OSHA requirements. Laying back slopes also applies for areas where the top of the trench box is lower than the top of the bank. Contractor shall employ the services of a Geotechnical Engineer for direction and guidance if unstable or difficult soils are encountered. In any event, the Contractor shall hold OWASA harmless for injuries and/or damages resulting from failure to properly adhere to trench protection regulations/requirements in force at the time of a failure or mishap including, but not limited to, damage to utilities, equipment, structures, paving, etc.

B. ROCK

- 1) **Rock Excavation/Definition:** Rock excavation shall consist of the removal and satisfactory disposal of all materials, which in the opinion of OWASA's Engineer, cannot be excavated except by drilling, blasting, "jack hammering or hoe ramming" (reasonable production for rock excavation by "jack hammering or hoe ramming" will be defined as 5 or more cubic yards per hour). Rock shall consist of undecomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than one-half cubic yard will be classified as rock. When rock is encountered in the trench, OWASA's Engineer must be notified before any rock has been blasted or removed. OWASA's Engineer will measure the rock, after which, the rock shall be excavated to a depth 6 inches below the grade of pipe and the bottom of trench brought back to grade by using an approved fill material. See paragraph 3.8, *Blasting* for other requirements regarding rock excavation.

- 2) **Cushioning Pipe in Rock:** Special precautions shall be exercised to prevent any pipe from resting on rock or any other hard projection that might cause breakage of pipe. At no time shall the pipe bell or the pipe barrel rest on rock. A minimum of 6 inches of stone cushioning is required between the barrel of the pipe and rock. A minimum of 12 inches of clearance is required between the sides of the pipe and the rock. See Standard Detail 511.01. Thicker cushioning may be required for deeper pipe on a case-by-case basis.
- 3) **Disposal of Rock:** Rock excavated from the trench shall be hauled off the site at the Contractor's expense. Borrow required to replace excavated rock shall be provided by the Contractor and for OWASA contracts, shall be included in the unit price bid for rock excavation. No rocks or boulders shall be used as backfill in any part of the trench. Where rock has scattered over adjoining property as a result of blasting, the Contractor shall remove the rock and restore the area to its original condition at no cost to OWASA.

C. PREPARATION OF FOUNDATION FOR PIPE LAYING

- 1) Excavation of trenches for all pipelines shall be done to line and grade as established by the Engineer. The bedding surface shall provide a firm, stable, and uniform support through the entire length of the pipe. Recesses shall be excavated to accommodate bells and joints. When bedded firmly on the subgrade, the pipe shall be on the exact grade of the completed water or sewer line.
- 2) **Unsuitable Trench Subgrade/Foundation Improvement:** If the trench subgrade is found to be soft, spongy, excessively wet, unstable or in any other way unfit such that there is inadequate pipe support, when directed by OWASA's Engineer, the material shall be removed for the full width of the trench, and the excavated area shall be strengthened for foundation purposes by furnishing and placing either approved clean stone, a concrete cradle, concrete mud mat, concrete encasement or a combination of these materials. Whenever the bottom of the trench is such that it cannot be reasonably stabilized, OWASA's Engineer may require the sewer to be laid in cradles or in cradles supported on piles. These foundations shall be placed as directed by the OWASA's Engineer.

Observe the following requirements when unstable trench bottom materials are encountered:

- a. Notify OWASA when unstable materials are encountered and define by drawing station locations and limits when encountered.
 - b. Remove unstable trench bottom materials as directed and replace with subgrade stabilization material specified.
- 3) **Over-Excavation:** Unauthorized over-excavation consists of removal of material beyond indicated subgrade elevations or side dimensions, without specific approval of OWASA's Engineer. Exercise care to avoid excavations below established grade where firm earth conditions exist. Where unauthorized excavations have been carried beyond points required, restore these areas to the elevations and dimensions shown on the drawings with approved fill material and compact as specified (as noted in the preceding paragraph). In no case shall the pipe be brought to grade by blocking under the barrel of the pipe. A uniform

support shall be provided for the entire length of the pipe. Unauthorized excavation shall be replaced at Contractor's expense.

D. TRENCH PREPARATION FOR PIPE

In all installations, the pipe trench needs to be excavated deep enough to accommodate the required depth of bedding and backfill, including recesses for pipe bells, as well as for the minimum and maximum cover depth per Table 02275.1.

1) Preparation of Trenches for Gravity Sewer Pipelines

The bottom of the pipe trench for gravity pipes shall be excavated to a minimum over depth as shown on Standard Detail 531.01 to provide for improved pipe bedding material for the entire length of the gravity pipeline, including sewer lateral connections, except in rock where bedding shall be a minimum of 6 inches deep for DI pipe and 8 inches deep for PVC pipe (see Standard Detail 511.01 and paragraph 3.2.E.2, above). The bedding shall be Table 02275.3.

2) Preparation of Trenches for Water Mains and Sewer Force Mains

The trenches for water lines and sewage force mains shall be graded to avoid local high points. Trenches shall be graded either level or on a continuous upslope to the high points designated on the drawings. Trenches shall be of such depth as to provide a minimum cover over the top of the pipe as noted in Table 02275.1. The trenches shall have 4 inches of loose soil in the bottom before pipe is placed, so pipe is firmly and continuous in contact with the soil. Pipe shall not bridge any areas. Rock larger than 2 inches shall be removed from the trench bottom and any voids filled with soil or clean stone. Bell holes shall be provided at each joint to permit proper joint assembly and proper pipe support. Rock shall be removed in accordance with Paragraph E. See Standard Detail 511.01.

Bedding for DIP water mains and sewer force mains shall conform to Standard Detail 511.01 (See also Paragraph 2.1 B- Bedding Definitions) for mains 12 inches and smaller with a maximum depth of cover of 10 feet. The design engineer shall consider laying conditions other than Type 1 for pipe 14 inches and larger or greater than 10 feet deep, consistent with DIPRA Design of Ductile Iron Pipe, to be approved by the OWASA engineer.

3) Surface or Ground Water in Trenches/Pipe

When ground water is encountered, the Contractor shall pump, or otherwise remove any water that accumulates in the trenches and shall perform all work necessary to keep the trenches clear from water while pipe is being laid. No pipe shall be laid in water and the pipe shall not be used as a means of draining ground water from the trench. The open end of the pipe shall be kept closed with a watertight plug to prevent washing of any foreign matter into the line. At the conclusion of the workday, or at any other time when pipe laying is not in progress, a watertight plug shall be placed in the bell of the last joint of pipe laid. All water removed from the trench shall be conveyed in a proper manner to a suitable point of discharge and shall comply with the applicable erosion and sedimentation laws. See paragraph 3.1.G – *Dewatering*, of this specification.

E. TRENCHING IN FILLS

In areas where trenching for pipes will be in fills, the fills shall be brought to an elevation of at least 12 inches above the top of the pipe, and then the trench excavated in the compacted fill, as herein specified for trench excavation.

F. EXCAVATION FOR STRUCTURES

- 1) Excavate to provide a minimum of 12 inches of horizontal clearance between outer surface of structure and trench wall.
- 2) Where rock is encountered so that a built-in-place manhole, precast structure (such as a manhole or vault), or other structure will bear over rock, remove the rock to a minimum of 8 inches below the foundation or footing of the structure and place an 8-inch cushion of clean #57 stone over the rock.

G. WATER MAIN BEND BLOCKING INSTALLATION

- 1) Excavate area to receive poured in place concrete blocking to exact dimensions shown in Standard Detail 512.02. Blocking is to be placed in undisturbed residual soils. If blocking is to be placed in areas where boulders or stumps have been removed or in areas of loosely compacted fills, such as in landscaped areas (outside of pavements or parking lots), contact OWASA's Engineer for directions.
- 2) Concrete shall be plain concrete with a minimum compressive strength of 3000 psi at 28 days.
- 3) Wrap bolts in plastic or provide other acceptable means of protection, approved by OWASA's Engineer before pouring concrete blocking.
- 4) Concrete thrust blocking and rodding is not required for installation of restrained joint piping unless directed and at the discretion of the OWASA Representative.

H. DEPOSITION OF EXCAVATED MATERIAL

- 1) All excavated material shall be placed on one side of the trench away from the roadway unless permission is given by OWASA's representative to place it on both sides. Excavated materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire alarm boxes, fire hydrants and gate valves on water pipes, which are located in the vicinity. Excavated material shall be placed so as to inconvenience the public as little as possible. All fences and walls shall be protected and, if damaged, shall be repaired or replaced in as good condition as before it was disturbed. Protect shade trees from stockpiling of material.
- 2) Exercise care when stockpiling excavated material on the bank in order to prevent surcharging the bank of the trench and potentially rendering the excavation unstable.
- 3) **Wasting of Unsuitable Material:** All surplus or unsuitable excavated materials are designated as waste and shall include, but are not limited to, material of an uncompactable nature, material unsatisfactory for backfill, trash and excess material shall be removed from project site and disposed at the Contractor's

expense. For OWASA contracts, where removal of unsatisfactory material is due to negligence on the part of the contractor (i.e., resulting from inadequate shoring or bracing, failure to dewater, improper material storage exposing it to rain or flooding, or other failure to meet specified requirements), work shall be performed at no additional cost to OWASA. If additional material is required, the Contractor shall supply same from an approved borrow pit at no additional cost to OWASA. Rock excavated from the trench shall be hauled off the site at the Contractor's expense.

3.3 BEDDING

A. BEDDING DEFINITIONS

See paragraph 2.1 B, *Pipe Bedding Definitions*.

B. MINIMUM BEDDING REQUIREMENTS BY TYPE OF PIPE

1) General

- a. In no case shall the #57 or #67 stone bedding be less than the minimum bedding shown in Standard Detail 531.01, unless specifically exempted in writing by OWASA's Engineer.
- b. Ductile Iron Pipe: Laying Condition and Pipe Bedding Definitions for ductile iron pipe are based on AWWA C150 and DIPRA's Design of Ductile Iron Pipe. Refer to Standard Detail 531.01 Sheet 1.
- c. Polyvinyl Chloride (PVC) Pipe: Laying Condition and Pipe Bedding Definitions are based on Unibell PVC Pipe Association Installation Guide for Solid-Wall PVC Sewer Pipe. Refer to Standard Detail 531.01 Sheet 2.

2) Sewer Mains and Sewer Laterals: Provide #57 or #67 stone trench bedding material.

- a. **DIP Gravity Pipe:** Pipe shall be bedded in carefully compacted sand, gravel, or crushed stone to a depth of 1/8 pipe diameter with a minimum of 4 inches of granular material between the pipe and pipe bells and the trench bottom and covering the full width of the trench. The bedding shall be shaped so that the bottom of the pipe rests on the bed. Bell holes and depressions as required of the joint shall be dug after the bedding has been graded and shaped, and shall only be of such length, depth, and width as required for properly making the particular type of joint. Provide an additional 1-inch depth of cushioning material for each additional 2 feet of depth in excess of 16 feet up to a maximum of 12 inches of cushioning material. See Section 3.2.E, paragraph 2, and Standard Detail 511.01. When the foundation is determined by OWASA to be unsuitable, improve foundation in accordance with Paragraph 3.2 F.
- b. **DIP Force Mains (Flat Bottom):** The ditch is excavated slightly above grade by excavation equipment and cut to finish grade by hand to undisturbed earth creating a flat bottom. Bell holes are dug, to prevent point loading the pipe bells, so that pipe bears uniformly upon the trench bottom between bell holes. Existing soil shall be shovel sliced or otherwise compacted under the

haunching of the pipe to provide uniform support. Do not bed sewage force mains in stone except as indicated for rock areas. For pipe 14 inches or greater in diameter or installed greater than 10 feet deep, the design engineer shall determine appropriate trench type for the depth of cover in accordance with DIPRA's Design of Ductile Iron Pipe, latest edition and the manufacturers recommendations, as approved by the OWASA engineer.

- c. **PVC C900 Gravity Pipe:** Pipe shall be bedded in sand, gravel, or crushed stone with a minimum compacted depth of 8 inches with an additional 1-inch depth of cushioning material for each additional 2 feet of depth in excess of 16 feet up to a maximum of 12 inches of cushioning material. See Standard Detail 531.01 for bedding, haunching, and backfill.

Blocking is required for the sewer lateral at the wye or tap to the main to prevent rotation.

- 3) **Water Pipe and Water Service Pipe, and Sewer Force Mains:** Do not bed water pipe and water service pipe in stone, unless as indicated for rock areas or as otherwise directed by the OWASA Engineer. The trenches shall have 4 inches of loose soil in the bottom before pipe is placed, so pipe is firmly and continuous in contact with the soil. Bell holes are dug to prevent point loading the pipe bells, such that pipe bears uniformly upon the trench bottom between bell holes. Existing soil shall be shovel sliced or otherwise compacted under the haunching of the pipe to provide uniform support. In poor soils, improve foundation in accordance with Paragraph 3.2 F.
- 4) **Bedding for Structures:** The bottom of manhole bases and other precast structures and appurtenances shall be excavated to minimum over depth of 12 inches below the bottom of the structure. The structures shall be placed on a minimum of 12 inches of clean stone bedding that has been firmly consolidated. Bedding material shall be shaped, graded, and compacted so that the entire bottom of the structure rests level on the material for its entire area.

C. BEDDING MATERIAL PLACEMENT

Unless otherwise specified, the bottom of the pipe trench for sanitary sewer shall be excavated to a minimum over depth of 6 inches below the bottom of the pipe, to provide for the compacted bedding materials, except as specified in rock. Rock larger than 3 inches shall be removed from the trench bottom and any voids filled with soil or clean stone. Bedding material shall be placed, shaped, and compacted so that at least the bottom half of the pipe rests uniformly upon the material for the entire length of the pipe: pipe shall not bridge any areas. Bell holes and depressions required for the jointing of pipe shall be dug after the compacted bedding material has been graded and shaped and shall be only of the length, depth, and width required to make the joint properly. **Care shall be taken to make sure bedding fills the voids beneath the pipe haunches, by poking with a shovel or tamper.**

3.4 HAUNCHING AND BACKFILLING (MATERIALS AND METHODS)

A. HAUNCHING AND BACKFILLING

1) General:

- a. Pipe and fittings shall be inspected before backfilling. Before placing any backfill, all rubbish, forms, blocks, wires, and other unsuitable material shall be removed from excavation.
- b. After the pipe has been brought to grade on a proper foundation, earth fill shall be placed carefully **and equally on both sides of pipe and structures to avoid displacement of the pipe or structure.** Exercise **extreme care** in backfilling operations to avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion. The pipe shall be tamped properly to hold the pipe or structure in position. Repair damages, distortions, or misalignments to full satisfaction of OWASA's Engineer. Pipe and structures shall be removed if broken or damaged during installation.
- c. Backfill shall closely follow the pipe installation. Unless otherwise directed or permitted by OWASA's Engineer, all pipe laid shall be backfilled during the same day, and prior to the completion of the day's work, to provide a firm continuous support and covering for the pipe.
- d. Reopen trenches that have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of OWASA's Engineer.
- e. Do not allow or cause any of the work performed or installed to be covered up or enclosed by work prior to required inspections, tests, and approvals. Should any of the work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no cost to OWASA.
- f. Observe specific pipe manufacturer's recommendations regarding methods of backfilling and compaction.
- g. Ensure compaction of each lift to requirements stated in these specifications. Place backfill in lifts not exceeding 6 inches (loose thickness) in areas to be paved and 12 inches for unpaved areas. See Table 02275.4.
- h. All pipe areas shall be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill.**
- i. Heavy equipment shall not be operated over any pipe until it has been properly backfilled and compacted with a vibratory compaction device and has a minimum cover as required by the plans. Pipe that is misaligned, shows excessive settlement, or has been otherwise damaged by the Contractor's operations, shall be removed and replaced at no cost to OWASA.**

- j. Metallic underground warning tape shall be installed directly over water or sewer main pipe in accordance with Paragraph 2.2D of this Section. See Section 02520 for additional Reclaimed Water installation requirements.
- k. Care shall be taken to prevent any disturbance to the pipe or damage to newly made joints. The filling of the trench shall be carried on simultaneously on both sides of the pipe in such a manner that injurious side pressures do not occur such that the pipe could be displaced or dislodged. Do not backfill on muddy or frozen soil.
- l. Sheet piling and shoring generally should be removed only when the trench below it has become substantially filled, and every precaution shall be taken to prevent any slides of material from the sides of the trench onto or against the pipe.

2) Ductile Iron Pipe

- a. **Materials:** See paragraph 2.1.A – *Material Classification* for Select Earth Backfill and Common Trench Backfill classification. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with unfrozen Common Trench Backfill material approved by OWASA's Engineer. In areas of extensive rock excavation, where there is a shortage of suitable backfill, the Contractor shall, at their own expense, haul suitable material in to be placed over the pipe.
- b. **Haunching and Backfill for DIP Gravity Pipe:**
 - i. **Carefully Compacted Select Earth Backfill:** Furnish carefully compacted select earth backfill where indicated on drawings and specified for compacted backfill conditions up to 12 inches above top of pipe. See paragraph 2.1 *Soil, Bedding, and Backfill* for definition of Select Earth.
 - ii. **Haunching:** The haunch area of the sewer pipe must be fully supported to the springline of the pipe with the bedding material; therefore, the granular material should be **hand-placed**, shovel sliced, **and hand tamped** or otherwise consolidated under the pipe haunch to the springline of the pipe.
 - iii. **Backfill:** The initial backfill from the pipe bedding to the top of the pipe shall consist of carefully placed select earth trench backfill; compacting to no less than 80% of the Standard Proctor maximum dry density. Carefully place backfill tamped around the pipe to the top of the pipe, bringing fill up both sides at the same time to avoid uneven pressures and pipe misalignment. Only hand tamping shall be used to compact earth around the pipe line. The remainder of the soil to the ground surface is to be common trench backfill compacted to the density specified in Table 3. When the backfill has been brought to 12 inches above the top of the barrel, pneumatic tampers may be used to compact the remainder of the soil. For lines placed in roadways **or in corrosive soils**, at the OWASA's Engineer's discretion and where conditions warrant, the Contractor may

be required to backfill with select earth trench backfill in lieu of common trench backfill.

3) PVC C900 Pipe

- a. **Materials:** See paragraph 2.1.A – *Material Classification* for Select Earth Backfill and Common Trench Backfill classification. Except as otherwise specified or directed for special conditions, backfill trenches from the stone backfill to the ground surface with unfrozen Common Trench Backfill material approved by OWASA's Engineer. In areas of extensive rock excavation, where there is a shortage of suitable backfill, the Contractor shall, at their own expense, haul suitable material in to be placed over the pipe.
- b. **Haunching and Backfill for PVC C900 Pipe**
 - i. **Haunching:** Proper placement and compaction of the haunching material are the most important factors critical for proper pipe performance and deflection. The haunch area of the sewer pipe must be fully supported to the springline of the pipe with the bedding material; therefore, the granular material shall be shovel-sliced or otherwise consolidated under the pipe haunch to the springline of the pipe carefully, bringing up both sides at the same time to avoid uneven pressures and pipe misalignment, and then carefully compacting. Side support is accomplished by tamping the soil firmly under the haunches of the pipe out to the trench walls. Tamping should be done in layers no greater than 6 inches. DO NOT DISTURB SIDE SUPPORT WHEN MOVING SHEETING OR TRENCH BOX.
 - ii. **Backfill:** The initial backfill from the springline of the pipe to a minimum 12 inches above the pipe shall consist of carefully placed #57 or #67 stone. Stone shall be covered with a non-woven geotextile separation fabric in accordance with Paragraph 2.2 A to prevent soil migration unless a geotechnical engineer has presented and OWASA has accepted analysis that the soil is not prone to migration. The remainder of the fill to the ground surface is to be common trench backfill compacted to the density specified in Table 3. Do not use machine compaction or rolling equipment until a minimum of 18 inches of backfill material has been placed over the top of the pipe. Pneumatic tampers may be used to compact the remained of the soil. If a hydro hammer is to be used to compact the backfill, a minimum of 3 feet of cover is required. Final backfill shall be tamped with a vibratory compaction device. See Table 02275.3 below for specific density requirements. For lines placed in roadways, at the OWASA's Engineer's discretion and where conditions warrant, the Contractor may be required to backfill with select earth trench backfill in lieu of common trench backfill.

4) Methods

- a. **Tolerances:** All areas within the limits designated on the drawings, including adjacent transition areas, shall be uniformly graded. The Contractor shall finish

surfaces within the specified tolerances with uniform levels or slopes between points where elevations or existing grades are shown.

- i. Finish subgrade areas that are to receive topsoil. Bring such areas to within 0.10 foot of required subgrade elevations.
 - ii. Under Sidewalks: Shape subgrade under sidewalks to line, grade, and cross-section. Subgrade is to be brought to within plus or minus 0.10 foot of required subgrade elevations.
 - iii. Under Pavement: Shape subgrade under pavement to line, grade, and cross-section. Bring to within ½ inch of required subgrade elevations.
- c. **Surface Protection – Traffic:** The Contractor shall protect newly graded areas from traffic and erosion, and repair and re-establish grade in settled, eroded, or rutted areas. Where compacted areas are disturbed by subsequent construction or adverse weather, the Contractor shall scarify the surface, reshape, and re-compact to the required density. If the Contractor shall fail to maintain any trench within 2 days after receipt of written notice from OWASA's Engineer, OWASA may refill said depressions and invoice the cost of such work to the Contractor, or for OWASA contracts, cost may be retained from monies due. In case of emergency, OWASA's Engineer may refill any dangerous depressions without prior notice to the Contractor.
- d. **Structures**

Structure Backfill: Backfill placed within 2 feet of manholes and other special structures shall be of the same quality as that specified for backfill around water or sewer lines. Take care to prevent wedging action of the backfill against structure by carrying the material uniformly around the structure so approximately the same elevation is maintained in each lift. **If necessary to prevent damage to the structure, provide temporary bracing of structure walls.** Material shall be solidly tamped with a mechanical or pneumatic tamper in such a way as to avoid damaging the structures or producing unequal pressures. The Contractor shall refill all excavations as rapidly as practical after completion of the structural work therein, or after the excavations have served their purpose.

3.5 COMPACTION/DENSITY

Soil shall be compacted using equipment suitable for the material and the work area location. There are two types of testing discussed in Section 3.5, Quality Control (QC) and Quality Assurance (QA).

A. TESTING

- 1) Testing of backfill shall be performed by an independent laboratory approved by OWASA and the Contractor. The Contractor shall be responsible for excavation of both types (QC and/or QA) of testing at no cost to OWASA.

2) Quality Control (QC) vs. Quality Assurance (QA):

QC testing is required testing that shall be performed by the Contractor to assure compliance with the requirements of these specifications. The associated cost for QC testing is the Contractor's responsibility. The contractor is also responsible for "re-testing" costs incurred by OWASA when OWASA's test results (tests for QA) results in a "failure."

QA testing, and associated costs will be paid for by OWASA. OWASA will contract with a separate testing firm for QA testing. QA testing may be conducted to ensure Contractor compliance with these specifications.

B. QUALITY ASSURANCE (QA)

In the course of backfilling trenches for utility installations, OWASA's Engineer may require "Field Density Determinations" or compaction tests **in addition to those required for Quality Control**. OWASA's Engineer will determine the location of the tests and OWASA shall engage a qualified testing firm to perform the test. The Contractor shall perform the excavation during normal working hours at no additional cost to OWASA. Field density determinations shall be performed in accordance with AASHTO T191, T204, and T205 modified to include material sizes used in the laboratory determination of density with nuclear field density testing device or by other approved methods. A representative of OWASA will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the OWASA's Engineer. When the average of 3 test results, with no one test failing by more than 3 percentage points, indicate that the density is less than the percent specified, the Contractor shall excavate and re-compact the areas that have failed at no expense to OWASA. Payment for a failed compaction test shall be made by the Contractor.

C. QUALITY CONTROL (QC)

The Contractor is required to perform Quality Control testing. Field density or compaction tests determinations shall be performed in accordance with AASHTO T191, T204, and T205 modified to include material sizes used in the laboratory determination of density with nuclear field density testing device or by other approved methods. A representative of OWASA will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the OWASA's Engineer. The Contractor shall pay for all costs associated with testing.

Table 02275.2	
Testing Frequency^a	
Location	Frequency
Trench areas in road crossings	1 per road crossing, and/or
Trench areas in road intersections	1 per road intersection, and/or
Trench areas	1 per 200 linear feet per two feet of fill thickness
Exception: Where additional tests are required to determine the extent of unacceptable compaction. In this case, the costs for these additional tests are the responsibility of the Contractor.	

^aEach test consists of a compaction test on each layer of backfill material in the trench segment.

D. SITE ACCESS FOR TESTING:

Ensure OWASA, at all times, has immediate access to the site for the testing of all soils related work. Ensure excavations are in a safe condition for testing personnel.

E. MINIMUM COMPACTION REQUIREMENTS

Unless noted otherwise on drawings or more stringently by other sections of these specifications, place and ensure backfill and fill materials achieve an equal or “higher” degree of compaction than undisturbed materials adjacent to the work; however, in no case shall degree of compaction fall below the following percentages of the maximum density at optimum moisture content. Tolerance is to be within +/- 2 percentage points of the optimum moisture content.

Table 02275.3		
Minimum Compaction Limits (Cohesive Soils)		
Location	Density	
Beneath and within 5 feet of buildings	100% of the maximum dry density by ASTM D698 (Standard Proctor), AASHTO T99.	
Areas under roadway pavement surfaces, curb and gutter, paved easements, and sidewalks	Top 12 inches	100% of the maximum dry density by ASTM D698 (Standard Proctor), AASHTO T99.
	Up to within 12 inches	95% of the maximum dry density by ASTM D698 (Standard Proctor), AASHTO T99.
Roadway shoulders	95% of the maximum dry density by ASTM D698 (Standard Proctor), AASHTO T99.	
Under turf, sodded, planted, or seeded non-traffic areas	90% of the maximum dry density by ASTM D698 (Standard Proctor), AASHTO T99.	

F. PASSING TEST

When the average of 3 test results, with no one test failing by more than 3 percentage points, indicate that the density is less than the percent specified, the Contractor shall excavate and re-compact the areas that have failed at no expense

to OWASA. However, where backfill compaction is suspect and questionable, the material shall be removed as directed by OWASA's Engineer and the area tested. If a suspect area fails to meet the prescribed minimum moisture density test requirements, the soil shall be removed, replaced, compacted, and re-tested, as directed by OWASA's Engineer, until the backfill meets or exceeds the minimum density requirements.

G. COMPACTION LIFTS

Table 02275.4	
Compaction Lift Thickness	
Lift Thickness (inches)	Location
6	Inside street rights-of-way and paved easements
12	Outside street rights-of-way

H. REFERENCE STANDARDS FOR IN-PLACE TESTING OF SOILS

Table 02275.5	
In-Place Density Tests	
Soil Type/Classification	Reference Standard
Crushed Rock	ASTM D4253 by percentage of relative density ASTM D1557 or D698 (Standard Proctor)
GW, GP, SW and SP	ASTM D4253 by percentage of relative density ASTM D1557 or D698 (Standard Proctor)
GM, GC, SM, SC, ML, CL	ASTM D2167, D1556, D6938, or D2937 by percentage of Standard Proctor Density according to ASTM D698 or AASHTO T99

3.6 SERVICE CUTS, DIRECTIONAL BORED OR PUNCHED SERVICES

A. OPEN TRENCHES

Sewer lateral and water service connections that cross paved streets shall be installed by saw cutting the pavement and opening the trench. The open trench width shall be no wider than 12 inches.

Lateral connection trenches in non-paved areas shall be buried as specified for gravity sewers and for water lines, as applicable. See Table 02275.1.

Bed and backfill water or sewer service pipes as outlined in Sections 3.3 and 3.4.

B. DIRECTIONAL BORING OR PUNCHING

At the direction of OWASA's Engineer, service pipes may be required to be "punched" or "directional bored" beneath the pavement.

3.7 PAVEMENT REPAIR AND REPLACEMENT

A. PAVED STREET REPAIR

This work shall consist of replacing sub base stone, and bituminous material in the street in areas where it becomes necessary to remove the original pavement for sewer and water main trenches. Pavement repair shall be the type to match the existing street pavement, as shown on the drawings, or as determined by OWASA's Engineer. The pavement patch shall provide a uniform and smooth driving surface free of humps or depressions.

B. CONSTRUCTION IN PUBLIC RIGHTS OF WAY

Water and sewer lines installed in or across NCDOT roads shall be installed in accordance with the requirements stipulated in the approved encroachment permit, if applicable, and the latest requirements of both the NCDOT *Standard Specifications for Roads and Structures* and the *Roadway Standard Drawings*. All water and sewer lines installed in or across Town of Carrboro or Town of Chapel Hill roads shall be in accordance with the respective town's standards.

When it is necessary to remove the existing pavements, prepared road surfaces, sidewalks, or curbing, it shall be the responsibility of the Contractor to replace these surfaces to original or better condition. The Contractor shall be responsible for contacting NCDOT, the Town of Carrboro, or the Town of Chapel Hill regarding pavement replacement, as applicable. Unless specified more stringently by the owner of the right-of-way, the backfill shall be compacted in accordance with Table 02275.3.

Contractor shall replace pavement base with a minimum of 10 inches of ABC compacted to 100% of the Modified Proctor (ASTM D1557) maximum dry density prior to pavement overlay.

C. CROSSING GRAVEL OR MACADAMIZED ROADWAY

When water and/or sewer lines are installed in or across roadways that have been macadamized or graveled, the Contractor shall save the gravel or stone and refill the upper 12 inches of the trench with the material and supply sufficient new stone or gravel to return the roadway to the original grade. It shall be the Contractor's responsibility to maintain the original grade by adding gravel or ABC until the ditch is stable and the pipeline accepted by OWASA. Maintain area as outlined in paragraph 3.4.A.2.b.iii- *Surface Protection – Traffic*.

D. CUTTING PAVEMENT

See also paragraph 3.1.D.2 – *Protection of Surface Features*. Perform cutting operations prior to commencing excavation operations to avoid excessive removal of asphalt / damage to roadway.

E. PROTECTION OF PAVEMENT

See paragraph 3.1.D.2 – *Protection of Surface Features*.

3.8 BLASTING

A. GENERAL

- 1) Blasting procedures shall conform to all applicable local, state, and federal laws and ordinances and shall be performed in accordance with OSHA *Standard 29 CFR part 1910.109, Explosives and Blasting Agents*; NCDOT Rules for Transporting Explosives; and local Fire Department Regulations. Prior to any blasting, a blasting permit shall be obtained. The approval of the OWASA's Engineer shall be obtained before any blasting takes place and OWASA's Engineer may fix the hours of blasting if they deem it to be necessary. The use of explosives shall be in accordance with approved methods that safeguard lives and property. Explosives shall only be handled, placed, and detonated by persons licensed in this work. It is the responsibility of the Contractor to provide proper notification to appropriate parties.
- 2) **Rock Excavation:** See *paragraphs 3.2.E. – Rock and 3.8.B.2* for the definition of rock.
- 3) The minimum insurance coverage for blasting shall be as annotated in the OWASA contract documents. The coverage shall include explosion and collapse. If blasting occurs within 200 feet of any underground structure or utility, underground coverage will be required. The owner and the property owners shall be named as "additional insured."
- 4) **Storage:** Store explosives in accordance with the Occupational Safety and Health Act and with other Federal, State and Local ordinances and regulations. The Contractor shall keep explosive materials that are on the job site in special constructed boxes provided with locks. These boxes shall be plainly identified as to their contents. Failure to comply with this specification shall be grounds for suspension of blasting operations until full compliance is made. No blasting shall be allowed unless a galvanometer is employed to check cap circuits.
- 5) OWASA may prohibit blasting when the method of detonation or the means of protection provided is inadequate. Blasting conducted with or without direct supervision of OWASA will not relieve the Contractor of the responsibilities stipulated herein.
- 6) Blasters shall not explode or attempt to explode blasting powder or high explosives unless it is performed with a suitable electric blasting machine. Electric current from batteries, telephone, or power lines shall not be used for detonation.
- 7) A minimum of 3 minutes prior to the detonation, the blaster shall inform competent flagmen, equipped with red flags, stationed at reasonable distances from the blast area at every avenue of approach, to warn all persons.
- 8) Immediately after the loading and tamping of the drill hole and before fixing the blast, the material to be blasted shall be covered on all exposed sides with blasting mats, or other approved protective material. After the protection has been applied, the blast shall be fired without unnecessary delay.

B. BLASTING PROCEDURE

- 1) The Contractor shall provide a blast warning signal system. The blast warning signal system shall consist of one or more air horns located at the blast site. The air horn(s) shall be audible a minimum of 1 mile from the blast site. The signals shall be one long horn 5 minutes prior to the blast, one short horn 1 minute prior to the blast, and one long horn after the blast to signal all clear. The Contractor shall erect two clear and legible blast warning signal signs at locations determined by OWASA's Engineer. The signs shall list the blast warning signal system, the Contractor Superintendent's name and telephone number, and the OWASA representative's name and telephone number.
- 2) The Contractor shall establish test pits at up to two representative locations along the alignment and up to three locations adjacent to the site proposed to be blasted to determine if the rock is "rippable" with a track backhoe caterpillar 225 or equivalent and the feasibility of rock excavation by "hoe ramming." If these procedures do not offer reasonable production for rock excavation, then blasting will be allowed unless otherwise indicated.
- 3) The Contractor shall notify in writing all property Owners within 300 feet of the proposed blast at least 1 week prior to the proposed blast and verbally on the day of the scheduled blast.
- 4) Blasting shall be limited to mid-morning hours on days of clear-to-partly cloudy skies with increasing surface temperature and light wind. The Contractor shall provide monitoring equipment to monitor all blasting. A copy of monitor record shall be given to OWASA daily.
- 5) The use of unconfined explosives shall be prohibited.
- 6) Unless otherwise stipulated in Title 13 of the NC Administrative Code, Chapter 7, the maximum allowable peak particle velocity shall be 1.25 inches per second for all structures located 0 to 300 feet from the blasting site. The maximum allowable peak particle velocity shall be 1.00 inch per second for all structures located 301 to 5,000 feet from the blasting site. The maximum allowable peak particle velocity shall be 0.75 inch per second for all structures located 5,001 feet and beyond from the blasting site.
- 7) To minimize vibration, minimum scaled distance (SD) of 50 shall be used to determine maximum explosive weight per delay. A test blast shall be conducted to verify the scaled distance. The maximum explosive weight per delay shall not exceed the distance from the blast to the nearest structure divided by 50 squared. Maximum explosive weight per delay may be revised pending outcome of test blast. The recommendations indicated for blasting criteria in no way relieves the Contractor of their liability.
- 8) The peak overpressure of air blast shall not exceed 0.015 pound per square inch or 138 decibels.
- 9) Pre-blast meetings may be scheduled with OWASA's Engineer to document hole depths and spacing, charge weight per delay, shot scheduling, and weather conditions. The Contractor shall obtain accurate measured distances from

structures to center of blast area prior to determining the safe maximum charge-weight per delay and loading blast holes.

- 10) Pre-blast and post blast surveys will be obtained by the Contractor using an "Independent Blasting Firm". The pre-blast and post blast surveys will include all occupied and vacant buildings and other Structures within 250 feet of the blasting area. Any pre-blast and post blast surveys performed by OWASA or the property owner in no way relieve the Contractor of their liability. The firm selected by the Contractor will be evaluated by the Engineer and Owner for approval. The "Independent Blasting Firm" shall obtain written permission from the property owners and submit a copy or copies to the engineer and owner prior to entering upon private property.

C. BLASTING MONITORING REQUIREMENTS

1) **Monitoring of Blast-Related Vibrations**

Pre-Construction Condition Assessment: The geotechnical engineering firm shall perform a pre-construction condition assessment to document the conditions of the nearby buildings and other sensitive nearby structures prior to the beginning of construction. The assessment shall be performed on all properties adjacent to the project site and any other properties as directed by the engineer or owner. The assessment shall include full color video and photographic documentation of all exteriors including building foundations and installation of crack monitors on façade cracks that might propagate due to blasting vibrations. All documentation of existing building conditions and information concerning the type and location of crack monitors shall be presented to the engineer and owner in a report prior to construction.

2) **Crack Monitoring During Blasting**

During blasting operations, the geotechnical firm shall perform periodic readings of sufficient frequency of the crack monitors that were installed during the pre-construction condition assessment to assess/monitor the effects of the blasting operations. All readings shall be provided to the Engineer and Owner within 48 hours of taking the reading. If the crack readings suggest that blasting vibrations are contributing to crack width, then the geotechnical firm shall immediately notify the Engineer and Owner and review the blasting operations. The geotechnical firm and the contractor shall then submit a detailed plan for repair, the contractor shall perform the repair at no cost to the Owner and develop and submit for review a revised blasting plan to address the vibration problems and minimize further damage and complaints.

3) **Vibration Monitoring During Blasting**

- a. **Procedure:** The geotechnical firm shall monitor vibrations at no less than two locations at the closest structures to the project during all blasting activities. The locations shall be selected by the geotechnical firm based on the location of the blasting activities and their relative position to nearby structures. Prior to blasting, a plan of the monitoring locations shall be submitted to the Engineer and Owner for approval. The location of the vibration monitors shall be adjusted during construction with approval by Engineer and Owner. The vibration monitors shall be established at the site so that background vibrations may be

determined prior to beginning construction and blasting. The sensitivity range of the seismograph shall be selected so that the recording is initiated below the maximum allowable particle velocity and extends above the highest excepted intensity. Specific activities of the vibration source shall be indexed in time to allow correlation with the arrivals on the vibration.

- b. **Project Vibration Criteria:** The maximum allowable particle velocity is as indicated in Section 3.8.B.6. If the data from the monitors indicate that vibrations are exceeding the established criteria, then the geotechnical firm shall immediately notify the Engineer and Owner and suspend the blasting operations which are generating the vibrations, until the geotechnical firm and Contractor have developed a revised blasting plan to resolve the problem. The problem shall be resolved by the Contractor at no additional cost to the Owner.
- c. **Instrumentation:** The vibration monitors shall consist of digital seismographs that display the particle velocities and associated frequencies plotted against the criteria for this project. Each seismograph shall contain geophones with response capability in three mutually perpendicular axes or components; one vertical and two horizontal (radial and transverse). The frequency response of the geophones shall be linear from at least 4 Hz to more than 200 Hz. The sensitivity shall range from less than 0.02 in/sec to more than 5.0 in/sec. The Blastmate III by InstanTel is one type of seismograph that is suitable for this project.
- d. **Calibration and Instrument Use:** The geotechnical firm shall field calibrate the vibration monitors before the start of each recording period. The transducer shall be positioned with the longitudinal axis toward the vibration source. Transducers must be adequately coupled with the ground. Operation of all vibration monitors shall be in accordance with the instrument manufacturer's instructions and recommendations. Vibration records shall be collected in waveform plot or strip chart plot. The peak vector sum of the particle velocity in longitudinal, transverse, and vertical planes shall be shown along with the respective dominant or principal frequencies. The highest recorded particle velocity (i.e., the vector sum of the three orthogonal directions), when indexed to a particle vibration event, shall be reported as the peak particle velocity. The recorded peak particle velocity shall be compared to criteria appropriate for the subject of concern.
- e. **Complaints:** In the event of a complaint, the geotechnical firm shall immediately contact the Engineer and Owner and review those blasting activities that are introducing vibrations. The geotechnical firm shall prepare a report documenting all relevant data such as the time and date presented in the complaint, a description of the blasting activities during the subject time/date, data from the monitoring instruments for the subject time/date, complaint information and a description (including photographs, if possible) of the alleged damage. The geotechnical firm and Contractor shall then submit for review a detailed plan for repair, and revised blasting plan to address the complaints. The Contractor will be required to perform the necessary repairs at no cost to the owner.
- f. **Additional Requirements:** In addition to the pre-construction condition assessment report, the geotechnical firm shall also provide monthly reports, as required, containing the results of the crack monitors and vibration monitors

during the blasting procedures. The reports shall document that the geotechnical firm is providing the work described by this specification.

The geotechnical firm shall submit a final report after the completion of the blasting operation that contains all previous reports in one document. The final report shall contain an “executive” summary of the various reports.

3.9 HIGHWAY CROSSING

A. BORE AND JACK

Pipeline crossing shall be installed in a steel casing pipe installed by the “dry bore and jacking” method. Length of steel pipe shall be welded to the preceding length installed. The carrier pipe shall be protected by spiders/skids constructed as shown on Standard Detail 517.01. The ductile iron carrier pipe shall be as specified for sewer and water pipe and shall be slip joint ductile iron pipe. If, in the opinion of the Contractor, boring and jacking of the highway crossing is not possible due to rock, they shall test drill, in the presence of OWASA’s Engineer at the proposed crossing locations, at least 3 evenly spaced points in the placement along the crossing alignment. Upon verifying the presence of rock at a depth that would conflict with the boring and jacking operation, the Contractor shall make application to the applicable Town or the NCDOT, as applicable, to allow open cutting of the crossing. The Contractor shall be responsible for providing all data and shall pay any fees required for this application. If the trench is allowed to be open cut, casing pipe shall be provided and the trench shall be backfilled entirely with #57 stone to the bottom of the pavement base course and the pavement restored within one day of placing the pipe. Non-woven fabric separation fabric is to be provided between the stone and the pavement.

B. STEEL CASING PIPE

The steel casing pipe shall be of the thickness as specified in Standard Detail 517.01. Refer to specification Section 02530, *Sanitary Sewer* and Section 02510, *Water Distribution* for casing pipe specifications.

C. AREMA

Installation shall be in accordance with the American Railway Engineering and Maintenance-Of-Way Assoc.

D. NO PIPE SETTLEMENT

The jacking operation shall be carried on in such a manner that settlement of the ground or the highway above the pipeline will not occur. The use of water or other fluids in connection with the boring and jacking operation shall not be allowed. Excavation shall be made by auger or manual methods, at the Contractor’s option, to suit the conditions encountered. The Contractor shall repair or replace, as directed by OWASA’s Engineer, at their own expense, casing pipe damaged during the jacking operation.

E. CARRIER PIPE

After installation of the casing pipe, the carrier pipe, if required, shall be installed. The ends of the casing shall be plugged in accordance with Standard Detail 517.01. Place a $\frac{3}{4}$ -inch diameter steel drain line at downstream end of casing and drain either to daylight or a blind French drain consisting of 1/4 cubic yard of #57 stone.

F. SAFETY TO TRAFFIC

All operations of the Contractor shall be subordinate to the free and unobstructed use of the highway right of way for passage of traffic without delay or danger to life, equipment, or property. The Contractor shall provide all necessary bracing, bulkheads, and shields to ensure complete safety to all traffic at all times.

3.10 RAILROAD CROSSING/TRACKS

Crossing of railroad tracks with water or sewer lines shall be by the method shown on the contract drawings and approved by the applicable Railroad Company. It is the responsibility of the Project Engineer and Contractor to contact the Railroad Company and to comply with all Railroad Company requirements for specifications, drawings, permits, etc. All water and sewer lines installed beneath railroad tracks shall be in accordance with the Railroad Company's policies, procedures, and permits requirements. The railroad right of way and track structure shall be fully restored to its original pre-existing condition and to the full satisfaction of the Railroad Company. The work shall not interrupt the use of the railroad tracks or in any way endanger the traffic on them.

3.11 UNDERGROUND RIVER OR CREEK CROSSINGS

Underground river or creek crossings shall be made either by horizontal directional drilling (HDD) with HDPE pipe or constructed in the dry by providing a temporary cofferdam or bulkhead. River or creek crossings shall be in accordance with OWASA's "Policy on Extension of Sewer Mains and Sewer Laterals," **this Manual, NCDEQ, the US Army Corps of Engineers, and all other agencies having jurisdiction.** Unless horizontal directional drilling is specified in the OWASA contract documents, river or creek crossings shall be made by providing a temporary cofferdam or bulkhead using ductile iron pipe for the crossing.

River or creek crossings shall be as near to perpendicular as possible to the stream.

A. COFFERDAM METHOD

The Contractor shall construct the river crossing in the "dry" by providing a temporary cofferdam or bulkhead of non-erodible material. The cofferdam shall not obstruct more than one-half of the water surface at any time and shall not extend more than 3 feet above the normal water surface. The Contractor shall not be allowed to operate construction equipment on the native stream bottom, except during removal of the cofferdam. The Contractor shall be advised that the level in any river can fluctuate rapidly.

- 1) Non-erodible material shall be defined as heavy coarse aggregate as specified on the plans. An earth core for the cofferdam may be constructed over the proposed excavations; however, the non-erodible materials shall be in place prior to the

placement of the earth, so that the erodible earth does not come in contact with the flowing water.

- 2) A bulkhead may be constructed in lieu of the cofferdam. The bulkhead shall be made of wood, steel or some like material suitable to withstand the hydraulic forces to permit construction in a dry trench.
- 3) Construct the crossings as indicated. The Contractor shall then remove the cofferdam, bulkhead, or whatever equipment or material that was used to construct the crossing. The bottom of the river in the construction area shall be restored to its original cross section. All disturbed areas on the banks of the river shall be seeded and mulched in accordance with paragraph 3.15 – *Seeding and Groundcover*.
- 4) Comply with all terms and conditions of all permits issued by the US Army Corps of Engineers and/or NCDEQ for this work.
- 5) The pipe and joints of water or sewer main entering or crossing streams shall be tested in place and shall exhibit zero infiltration. This testing shall be done prior to encasing in concrete.

B. HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD

HDPE pipe shall be installed by horizontal directional drilling using a surface mounted rig, first to drill a guided hole along a bore path consisting of a shall arc and then to pull a string of pipe into the hole. Pull back is facilitated by a back-reamer, which enlarges the hole to approximately one and a half times the pipe diameter. Drilling fluids are injected into the bore hole to stabilize the hole and lubricate the pipe and drilling string. Tracking equipment is used to guide and direct the drilling. See Section 02510, *Water Distribution* for installation, testing and other requirements for horizontal directional drilling.

3.12 SURFACE WATER CROSSINGS

Surface water crossings, with pipe above the water, shall be adequately supported by casing pipe or beams as shown on **Standard Details** 536.03, 536.04, and 536.06. Surface water crossings with pipe under streambed shall have the pipe encased in concrete in accordance with Standard Detail 536.08.

3.13 CONCRETE COLLARS ON SEWER MAINS

Concrete collars shall be used on sewer lines with slopes 20% or greater. At least one concrete collar shall be placed before the bell of each joint of pipe (see Standard Detail 536.01). Additional collars may be required by OWASA.

3.14 CLEANUP AND RESTORATION OF SITE

A. DEBRIS

During the progress of the work, the Contractor shall keep the premises and the vicinity of the work clear from unsightly and disorderly piles of debris. Suitable locations shall be specified for the various construction materials and for debris. The materials shall

be kept in their storage locations, except as needed for the work and debris shall be promptly and regularly collected and deposited in the specified location.

B. GRADING

Upon completion of section of pipeline and appurtenances, the Contractor shall fine grade the ground adjacent thereto, removing all surplus excavated material, leaving the area free from surface irregularities. They shall dispose of all surplus material, dirt, and rubbish from the site; and shall keep the site free of mud and dust to the satisfaction of OWASA's Engineer. The contractor may be required to flush or sprinkle the street to prevent dust nuisance.

C. SHOULDERS

When working on the shoulders of paved roads, the Contractor shall keep the pavement clean of all loose earth, dust, mud, gravel, etc., and shall restore road surfaces, shoulders, and ditches as required by either the NCDOT or the right-of-way owner.

D. GRADING EASEMENTS

Easements shall be graded to have cross slopes of 4% or less. The ground surfaces of easements shall be graded and cleared in such a way to promote proper drainage and allow mowing by vehicular equipment without damage to equipment from rocks and other debris.

E. CLEANUP

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the site free, clean, and in good condition.

F. ONE-YEAR RESPONSIBILITY

The Contractor shall keep the surface over and along the trenches and other excavation in a safe and satisfactory condition during the progress of the work and for a period of one year after the work has been completed. They shall be held responsible for any accidents that may occur on the account of the defective condition of such surface.

3.15 SEEDING & GROUND COVER

Seeding and groundcover includes seedbed preparation, liming, fertilizing, seeding, and mulching of all disturbed areas. Areas inside or outside the limits of construction that are disturbed by the Contractor's operation and activity shall be seeded and mulched.

A. SEED

Unless called for otherwise on the Erosion and Sedimentation Control Plan, in areas where natural sod or vegetation has been disturbed, the area shall be seeded with the following:

Fertilizer:	10-10-10	Rate:	500 lbs. per Acre
Seed:	Kentucky 31 Fescue	Rate:	80 lbs. per Acre

If the line is installed through a landscaped lawn, the seeding shall be modified to restore ground cover comparable to the existing lawn.

B. ESTABLISHING VEGETATION

Seeding shall be carried out as soon as practical after the construction in any one area and shall be maintained against erosion through the completion of the project. Seeding shall be accomplished as work progresses.

The Contractor shall be responsible for proper care of the seeded area during the period that vegetation is being established. In the event of an erosive rain before an adequate stand of vegetation has been established, damaged areas shall be repaired, fertilized, seeded, and mulched at the Contractor's expense.

Seeding on rights of way of NCDOT maintained roads shall be in accordance with NCDOT specifications and the requirements of the approved encroachment permit.

C. TEMPORARY SEEDING

Denuded areas to be graded during the construction phases that are not to be brought to final grade within 30 days shall receive temporary seeding within 15 days of completing initial earthwork. Note that the time for establishment of permanent ground cover is 15 working days or 30 calendar days, whichever is shorter. Temporary seeding shall also be used to stabilize finished grade areas if the time of year is outside the specified permanent seeding periods.

D. STOCKPILE AREA

The Contractor is responsible for securing a material lay down and stockpile storage area. As such, the Contractor is responsible for the necessary erosion control measures, including but not necessarily limited to, a construction entrance, silt fence, protection of streams/buffers, clean up and restoration of site to the satisfaction of both OWASA and the NCDEQ, Division of Land, Minerals, and Energy. Stockpile and/or waste areas must be maintained within the limits of the areas protected by the proposed measures and otherwise temporarily seeded if to be left stockpiled over 30 days.

3.16 MISCELLANEOUS

A. DUST CONTROL

The Contractor shall be required to sprinkle with water or to apply dust allaying materials in the vicinity of dwellings, schools, churches, stores, or other places, where in the opinion of OWASA's Engineer, it is necessary to ensure that dust is held to an absolute minimum. For OWASA contracts, dust control is considered incidental and shall be carried out at the Contractor's expense.

B. IDENTIFICATION OF NEW WATER OR SEWER LINES

Underground Warning Tape and Tracing Wire: Placement of underground warning tape and Tracing Wire during backfill operations shall be required on all newly installed mains and service laterals.

- 1) Underground warning tape is to be placed 18-24 inches below the finished grade directly above the line. **Underground tracing wire shall be attached to the top of the main with zip ties, electrical tape, or duct tape every 5 feet. Water and corrosion proof connectors shall be used when splicing wire together, and electrical conductivity along the pipe shall be continuous and uninterrupted between main and valve and meter vault/boxes or terminal access point. A sufficient excess length of wire shall be left in each box or terminal access point to provide at least a 12- to 24-inch length of wire above finished grade, coiled and carefully fastened within the box to prevent loose wire. Installation shall be per Standard Details 513.01 and 531.01. Testing of tracing wire shall be witnessed by OWASA after backfilling is completed, with any untraceable wire replaced by the contractor.** For reclaimed water mains see Section 02520.

Materials shall be per paragraph 2.2.D, *Tracer Tape and Tracer Wire* of this Section.

C. FLOWABLE FILL CONCRETE BACKFILL

When directed by OWASA's Engineer, the Contractor shall backfill trenches or undercut areas with flowable fill concrete plant mix. To allow for future re-excavation of filled area, concrete strength shall be liquid enough to flow, be self-leveling, and have an ultimate minimum strength 225 psi (this product is a combination of sand and Portland cement). Except for structural applications, traffic can be placed on mixture within an hour or two after placement. Final surfacing of pavements; however, should be delayed if possible, at least 24 hours to allow for shrinkage and hydration of concrete. Settlement of 2" to 3" is to be expected.

The option to use flowable fill is open to the Contractor to reduce delay and inconvenience to traffic. However, for OWASA contracts, payment for flowable fill backfill is considered incidental to the cost of construction unless a pay item has been provided in the proposal, a change order has been approved, or the Contractor is ordered by the OWASA's Engineer to place flowable fill concrete as an emergency measure.

D. SALVAGE OF USEABLE MATERIALS

All materials such as paving blocks, brick, castings, and pipe etc., removed during excavation that is useable on this project shall be used after approval of its use by OWASA's Engineer or the applicable owner of the street right-of-way. Such material shall be stockpiled on site. Unnecessary abuse and damage to these items shall be the Contractor's responsibility and the cost of replacement may be deducted from the retainage.

END OF SECTION 02275

[Back to Top](#)



SECTION 02370 – EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Contractor shall provide erosion and sedimentation control work in accordance with the Contract Documents and the approved permit. Work shall include, but not be limited, to the following:
 - 1. Installation of erosion and sedimentation control measures.
 - 2. Maintenance of erosion and sedimentation control measures during construction.
 - 3. Removal and cleanup of erosion and sedimentation control measures.
 - 4. Temporary and permanent ground cover.
 - 5. Erosion and sedimentation control for borrow pit, disposal areas, haul roads, and storage areas as required by Contractor. Cost shall include erosion and sedimentation control permits as necessary for borrow and disposal areas.

1.2 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
 - 1. Section 02275 – Trenching, Backfilling, and Compaction of Utilities
 - 2. Section 02900 – Lawns and Grasses

1.3 REFERENCED STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T88 - Standard Specification for Particle Size Analysis of Soils
 - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
- B. ASTM International:
 - 1. ASTM C127 - Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))

3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³))
 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 6. ASTM D6459 - Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Hillslopes from Rainfall-Induced Erosion
 7. ASTM D6460 - Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion
- C. North Carolina Sedimentation Control Commission:
1. Erosion and Sediment Control Planning and Design Manual, latest revision
 2. The North Carolina Sedimentation Pollution Control Act of 1973, including all subsequent amendments
- D. North Carolina Department of Transportation (NCDOT):
1. NCDOT Standard Specifications for Roads and Structures, latest revision

1.4 DEFINITIONS

- A. Storm drain inlet protection (Block and gravel inlet protection): A sediment control barrier formed around a storm drain inlet by the use of standard concrete block and gravel.
- B. Silt fence (sediment fence): A temporary sediment control measure consisting of fabric buried at the bottom, stretched, and supported by posts.
- C. Silt fence J-Hook: Extension of the silt fence perpendicular to the primary fence laying direction, intended to trap or slow storm run-off and force run-off to pass through a silt fence outlet.
- D. Silt fence outlet: A temporary measure of wire-mesh hardware cloth between steel posts of an installed silt fence. The hardware cloth supporting washed stone will be placed on the draining side of the silt fence.
- E. Sand bag protection: Use of sand bags, laid tightly together to prevent drainage and sediment from flowing down a specific route, typically a paved surface.
- F. NCDOT No. 57 crushed stone: Defined in NCDOT Standard Specifications, Section 10, latest version.

1.5 SUBMITTALS

- A. Submit the following in accordance with Section 01 13 00 – Submittals:
 - 1. Shop Drawings: Provide all descriptive data regarding products, including materials, performance metrics, and suppliers.
 - a. Silt fence, stone material, hardware cloth, steel posts, filter cloth
 - 2. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Conform to the rules and regulations of the North Carolina Sedimentation Pollution Control Act of 1973 and the Rules and Regulations as amended and the local jurisdiction where the project is located.
 - 2. Comply with the applicable Federal, State, and Local regulations relating to pollution prevention and control.
 - 3. Project Superintendent shall be fully informed of such regulations, which affect the conduct of the Work, and shall observe and comply with such regulations.
- B. The Contractor shall provide permanent or temporary ground cover as soon as possible over disturbed areas of the site, and shall provide permanent or temporary ground cover in no more than 30 calendar days after construction activities have permanently or temporarily ceased over the disturbed areas. Temporary or permanent ground cover shall be provided on slopes within 15 calendar days after construction activities have permanently or temporarily ceased, or as required by the Erosion and Sedimentation Control and Construction Stormwater permits.
- C. Contractor is liable for damages to public and private property and fines as may be placed on the Project by the governing agencies due to failure to provide adequate erosion and sedimentation control devices.
- D. The Contractor shall have full responsibility for the construction and maintenance of erosion control and sedimentation control facilities as shown on the Drawings and as specified herein. The Contractor shall at all times provide the operation and maintenance necessary to operate the permitted sediment and erosion controls at optimum efficiency.
- E. Failure to install and maintain the necessary measures to control erosion and sedimentation will result in a notification from the Owner to suspend other work at the site until corrective steps have been taken to control the erosion or sedimentation. Failure to perform such measures within 24 hours after receipt of such notice, may lead the Owner to have such corrections performed by others.

The cost of such work performed by others will be deducted from monies due to the Contractor.

- F. Such suspension of operations will not justify an extension of Contract time nor additional compensation.

PART 2 - PRODUCTS

2.1 FILTER CLOTH

- A. Provide spun synthetic fiber; 10 ounces per square yard; burst strength of 500 psi, vertical water flow, 265 gallons per minute per square yard; Trivera 1135, MIRAFL 140, or approved equal.

2.2 WIRE STAPLES

- A. 16-gauge steel wire, U-shaped, with minimum of 3 inch top and 6 inch long legs for cohesive soils, and 8 inch long legs for non-cohesive soils.

2.3 TEMPORARY SEEDING

- A. Temporary seeding shall be performed in accordance with Section 02900 – Lawns and Grasses.

2.4 HARDWARE CLOTH AND INLET PROTECTION

- A. Use steel T-posts for securing the wire mesh hardware cloth barriers. Posts should be 1.25 pounds per foot steel with a minimum length of 5 feet. Posts should have projections to facilitate fastening the hardware cloth.
- B. The wire mesh should be at least a 19-gauge hardware cloth with a ¼-inch mesh opening.
- C. Use NCDOT No. 5 or No. 57 crushed stone for stone filters.

2.5 SILT FENCING

- A. Use a synthetic filter fabric of at least 95% by weight of polyolefins or polyester, which is certified by the manufacturer or supplier as conforming to the requirements in ASTM D6461, which is shown in part in the following Table 31 25 00.1. Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120 degrees F.
- B. Ensure that posts for silt fences are 1.33 pounds per foot steel with a minimum length of 5 feet. Make sure that steel posts have projections to facilitate fastening the fabric.
- C. For reinforcement of standard strength filter fabric, use wire fence with a minimum 14-gauge and a maximum mesh spacing of 6 inches.

- D. For silt fence outlets, use NCDOT No. 57 washed stone. Use hardware cloth as specified elsewhere in this Section. Use geotextile fabric as specified in Section 02275 – Trenching, Backfilling, and Compaction of Utilities. Use galvanized welded wire fencing of sufficient strength to support the hardware cloth and filter stone.

Table 31 25 00.1

Temporary Silt Fence Material Property Requirements					
	Test Material	Units	Supported ¹ Silt Fence	Un-Supported ¹ Silt Fence	Type of Value
Grab Strength	ASTM D 4632	N (lbs)			
Machine Direction			400	550	MARV
			(90)	(90)	
X-Machine Direction			400	450	MARV
			(90)	(90)	
Permittivity ²	ASTM D 4491	sec-1	0.05	0.05	MARV
Apparent Opening Size ²	ASTM D 4751	mm	0.60	0.60	Max. ARV ³
		(US Sieve #)	(30)	(30)	
Ultraviolet Stability	ASTM D 4355	% Retained Strength	70% after 500h of exposure	70% after 500h of exposure	Typical
¹ Silt Fence support shall consist of 14 gage steel wire with a mesh spacing of 150 mm (6 inches), or prefabricated polymer mesh of equivalent strength. ² These default values are based on empirical evidence with a variety of sediment. For environmentally sensitive areas, a review of previous experience and/or site or regionally specific geotextile tests in accordance with Test Method D 5141 should be performed by the agency to confirm suitability of these requirements. ³ As measured in accordance with Test Method D 4632.					

2.6 SEEDING AND SOIL SUPPLEMENTS

- A. As specified in Section 02900 – Lawns and Grasses

2.7 MULCH

- A. As specified in Section 02900 – Lawns and Grasses

PART 3 - EXECUTION

3.1 INSTALLATION OF EROSION CONTROL DEVICES

- A. Clear only as necessary for the installation of erosion control devices.
- B. Install temporary erosion control devices as indicated on the Drawings, which shall be in place and operational prior to other land disturbing activity.
- C. After installation of erosion control devices, request an inspection by the agency having jurisdiction as indicated on the permit. Obtain approval of erosion control measures from the agency representative prior to starting land disturbing activity.
- D. Prior to the start and throughout the construction, verify that reasonable measures are being taken to prevent the sediment from leaving the site or

damaging existing and new facilities, nearby watercourses, and adjacent property.

- E. If additional measures are believed necessary to adequately prevent erosion, immediately notify Engineer. If rain is predicted before the Engineer can be notified, take measures as necessary to prevent sediment from leaving the work area. The additional work will be paid for as provided in the General Conditions.
- F. Incorporate permanent erosion control work into the project at the earliest practicable time. Coordinate temporary erosion control measures with permanent erosion control measures and other work on the project to assure effective and continuous erosion control throughout the construction.
 - 1. Seeding and fertilizer shall be installed in accordance with Section 02900 – Lawns and Grasses.
- G. Hardware cloth and gravel inlet protection:
 - 1. Uniformly grade a shallow depression approaching the inlet.
 - 2. Drive 5-foot steel posts 2 feet into the ground surrounding the inlet. Space posts evenly around the perimeter of the inlet, a maximum of 4 feet apart.
 - 3. Surround the posts with wire mesh hardware cloth. Secure the wire mesh to the steel posts at the top, middle, and bottom. Placing a 2-foot flap of the wire mesh under the gravel for anchoring is recommended.
 - 4. Place clean gravel (NCDOT No. 5 or No. 57 stone) on a 2 to 1 slope with a height of 16 inches around the wire, and smooth to an even grade.
 - 5. Once the contributing drainage area has been stabilized, remove accumulated sediment, and establish final grading elevations.
 - 6. Compact the area properly and stabilize it with groundcover.
- H. Block and gravel inlet protection:
 - 1. Lay one block on each side of the structure on its side in the bottom row to allow pool drainage. The foundation should be excavated at least 2 inches below the crest of the storm drain. Place the bottom row of blocks against the edge of the storm drain for lateral support and to avoid washouts when overflow occurs. If needed, give lateral support to subsequent rows by placing 2-inch by 4-inch wood studs through block openings.
 - 2. Carefully fit hardware cloth or comparable wire mesh with ½-inch openings over all block openings to hold gravel in place.

3. Use clean gravel, $\frac{3}{4}$ - to $\frac{1}{2}$ -inch in diameter, placed 2 inches below the top of the block on a 2 to 1 slope or flatter and smooth it to an even grade. NCDOT No. 57 washed stone is recommended.
4. If only stone and gravel are used, keep the slope toward the inlet no steeper than 3 to 1. Leave a minimum 1-foot wide level stone area between the structure and around the inlet to prevent gravel from entering inlet. On the slope toward the inlet, use stone 3 inches in diameter or larger. On the slope away from the inlet use $\frac{1}{2}$ - to $\frac{3}{4}$ -inch gravel (NCDOT No. 57 washed stone) at a minimum thickness of 1 foot.

I. Silt fencing:

1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
2. Ensure that the height of the silt fence does not exceed 24 inches above the ground surface. Higher fences may impound volumes of water sufficient to cause failure of the structure.
3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.
4. Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have minimum 50 pound tensile strength.
5. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Support posts should be driven securely into the ground a minimum of 24 inches.
6. Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have a minimum 50 pound tensile strength.
7. Install J-hook at locations indicated on Drawings and in conformance with the Drawings.
8. Install silt fence outlets in location indicated on Drawings and in conformance with the Drawings.

- J. Silt fencing: Alternative Slicing Installation Method - Instead of excavating a trench, placing fabric and then backfilling trench; silt fence may be installed using specially designed equipment that inserts the fabric into a cut sliced in the ground with a disc.

1. The base of both end posts should be at least one foot higher than the middle of the fence. Check with a level if necessary.
2. Install posts 4 feet apart in critical areas and 6 feet apart on standard applications.
3. Install posts 2 feet deep on the downstream side of the silt fence, and as close as possible to the fabric, enabling posts to support the fabric from upstream water pressure.
4. Install posts with the nipples facing away from the silt fabric.
5. Attach the fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1 inch vertically apart. Also, each tie should be positioned to hang on a post nipple when tightened to prevent sagging.
6. Wrap approximately 6 inches of fabric around the end posts and secure with 3 ties.
7. No more than 24 inches of a 36 inch fabric is allowed above ground level.
8. The installation should be checked and corrected for any deviations before compaction.
9. Compaction is vitally important for effective results. Compact the soil immediately next to the silt fence fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first, and then each side twice for a total of 4 trips.
10. Install J-hook at locations indicated on Drawings and in accordance with the Drawings.
11. Install silt fence outlets in location indicated on Drawings and in accordance with the Drawings.

3.2 MAINTENANCE OF EROSION CONTROL DEVICES

- A. Install, inspect, and maintain erosion and sedimentation control devices, and records, in accordance with the approved Erosion and Sedimentation Control Permit.
- B. After above required inspections, make required repairs immediately.
- C. Remove sediment deposits when deposits reach approximately one-half of the capacity of the erosion control device.
- D. Respread accumulated sediments on the project site in a manner that will not adversely affect erosion control facilities and permanent ground cover.

- E. Maintain erosion control devices during construction until the disturbed areas are stabilized and the agency having jurisdiction and the Engineer or Owner have approved the removal of the erosion control devices.
- F. Hardware cloth and gravel inlet protection:
 - 1. Inspect inlets at least weekly and after each significant ($\frac{1}{2}$ -inch or greater) rainfall event.
 - 2. Clear the mesh wire of any debris or other objects to provide adequate flow for subsequent rains. Take care not to damage or undercut the wire mesh during sediment removal.
 - 3. Replace stone as needed.
- G. Block and gravel inlet protection:
 - 1. Inspect the barrier at least weekly and after each significant ($\frac{1}{2}$ -inch or greater) rainfall and make repairs as needed.
 - 2. Remove sediment as necessary to provide adequate storage volume for subsequent rains.
 - 3. When the contributing drainage area has been adequately stabilized, remove all materials and any unstable soil, and either salvage or dispose of it properly. Bring the disturbed area to proper grade, then smooth and compact it. Appropriately stabilize all bare areas around the inlet.
- H. Silt fencing:
 - 1. Inspect silt fences at least once per week and after each rainfall. Make any required repairs immediately.
 - 2. Should the fabric of a silt fence collapse, tear, decompose, or become ineffective, replace it promptly.
 - 3. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.
 - 4. Remove all fencing materials and unstable sediment deposits, bring the area to grade, and stabilize it after the contributing drainage area has been properly stabilized.
 - 5. Should the filter fabric decompose or become ineffective before approval of its removal by the Owner or Engineer, replace fabric immediately at no additional cost to the Owner.

- I. Silt fencing outlets:
 1. Inspect outlets at least weekly and after each significant (½-inch or greater) rainfall event and repair immediately. Clean out sediment, straw, limbs, or other debris that could clog the outlet, when needed.
 2. Remove sediment when half of stone outlet is covered. In addition, remove sediment as needed to prevent damage, allow drainage through the outlet, and prevent large flows from carrying sediment through the outlet. Correct as needed.
 3. Replace stone as necessary to ensure passage of water through stone.

3.3 SEEDING

- A. Disturbed areas not covered by new construction shall be seeded.
- B. Provide temporary and permanent seeding in accordance with 32 92 00 – Lawns and Grasses.
- C. Any areas which are not to be further graded within a 14 calendar day period, or which have not been graded within 14 calendar days shall be seeded in accordance with the following Table:

Table 31 25 00.2 – Seeding Stabilization Requirements

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES, AND SLOPES	7 CALENDAR DAYS	NONE
HIGH QUALITY WATER (HOW) ZONES	7 CALENDAR DAYS	NONE
SLOPES STEPPER THAN 3 TO 1	7 CALENDAR DAYS	IF SLOPES ARE 10 FEET OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2 TO 1, 14 CALENDAR DAYS ARE ALLOWED
SLOPES 3 TO 1, OR FLATTER	14 CALENDAR DAYS	7 CALENDAR DAYS FOR SLOPES GREATER THAN 50 FEET IN LENGTH
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4 TO 1	14 CALENDAR DAYS	NONE, EXCEPT FOR PERIMETERS AND ZONES

3.4 GENERAL

- A. Prior to suspension of operations on the project or any portion thereof, take necessary measures to protect the disturbed surface areas from erosion during the period of suspension.
- B. Provide diversion swales as necessary to prevent concentrated flow of water across disturbed areas.
- C. Stockpile excavated material on the opposite side of the utility trenches from the watercourses to the extent possible.

- D. In the event that stockpiles are placed on the watercourse side of the trench, provide silt fence or swales with stone filter outlets along the entire length of the stockpile. Upon the completion of backfilling, the area shall be seeded and mulched in accordance with the Contract Documents.
- E. Provide a settling basin with a gravel filter outlet for water pumped from trenches or dewatering equipment.
- F. Tamp, fertilize, seed, and mulch the disturbed areas as soon as practicable after pipeline is installed and, in all cases, no later than 30 calendar days after completion of the pipeline segment or work at a particular site.
- G. If construction operations are suspended for more than 15 calendar days, provide temporary seeding and mulching in accordance with the Contract Documents, of all disturbed areas including those areas in which further construction is necessary.
- H. Matting shall be installed where shown on the Drawings or where required for erosion control. Install matting in accordance with NCDOT Specifications and the Contract Documents.
- I. All open cut crossings of ditches shall be completed in one working day.
- J. Spoil and debris shall not be placed within 50-feet of storm drains or streams.
- K. Provide portable self-contained concrete truck washout system. All concrete trucks will utilize portable washout system for cleaning. No concrete washout will be allowed to be discharged to ground, and no concrete washout debris shall be allowed on ground.
- L. Remove demolition debris from site on a daily basis and properly dispose in accordance with applicable regulations.
- M. A layer of sand, fines, or screenings shall be placed on paved surfaces before deposition of excavated material. After removal of excavated material from paved surfaces, a mechanical sweeper shall be used to remove material from paved surfaces. Paved surfaces shall be swept on a daily basis and swept material placed on non-paved surfaces within limits of disturbance, or disposed of properly.

3.5 BORROW AND DISPOSAL AREAS

- A. Obtain and pay for erosion control permit for, storage yard, borrow area, and disposal areas as required.
- B. Install and maintain erosion control devices in accordance with Contractor's approved plan.

3.6 STABILIZATION AND CLEAN-UP

- A. Remove erosion control devices upon the approval of the permanent stabilization of the site by the agency having jurisdiction of the area and the Engineer. Dress sediment deposits remaining in place after the erosion control devices are removed to conform to the existing grade, prepared and seeded. Costs for removal of all erosion and sedimentation control devices shall be borne by the Contractor.

END OF SECTION 02370

02510 - WATER DISTRIBUTION

(Last revised 01/01/2025)

SUGGESTED SEARCH WORDS FOR THIS SECTION

Part 1 – General	Hydrant Bagging	Steel Encasement Pipe-Install
Part 2 – Products	Fire Hydrant-Spec	Steel Encasement Pipe-Spec
Part 3 – Execution	Fire Hydrants-Setting	Sterilization
Air Release Valve-Spec	Gate Valves-Spec	Small Service Connections-Spec
Backflow Preventers	1 ½" & 2" Service-Spec	Tape, Detector
Butterfly Valve-Spec	Meter Boxes, Small-Spec	Tunneling Method
Check Valve-Spec	Meters	Tunnel Liner - Spec
Ductile Iron Pipe - Spec	Parallel Pipe-Clearances	Tapping Sleeve & Valve-Spec
DIP-Installation	Pipe Crossing Clearances	Vault Access Frames-Spec
DIP Fittings	Pipe Separation Req'ts	Valve Boxes-Spec
DIP Joints	Pressure Test & Leakage	Valves-Settings
Fire Hydrant Painting	PVC Pipe Spec	

PART 1 – GENERAL**1.1 RELATED DOCUMENTS**

Drawings and general provisions of the OWASA Contract, including the General Requirements and Supplementary Conditions, apply to this specification.

Section 02275 – TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES.

1.2 SUMMARY

This section includes all equipment, labor, material, and services required for complete installation of water distribution piping and specialties for municipal water and fire-service mains and services.

1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to water distribution systems that come under the authority of OWASA as specified within this and other sections of this manual.

Combined Domestic and Fire Protection Service: Service supplying a residential dwelling that includes an integrated fire suppression system.

Fire Service: Exterior firefighting/suppression water piping.

Water Main: Exterior water systems for both domestic water and fire suppression needs.

Water Service: Exterior water piping used to provide water for domestic purposes.

The following are industry abbreviation for various pipe materials:

- AC:** Asbestos Cement Pipe
- CI:** Cast Iron Pipe
- DIP:** Ductile Iron Pipe
- PVC:** Polyvinyl Chloride Pipe
- RCP:** Reinforced Concrete Pipe

1.4 SUBMITTALS

A. PRODUCT DATA

Submit product data for the following:

- 1) Pipe and fittings,
- 2) Valves and accessories,
- 3) Water meters and accessories,
- 4) Detector check valves,
- 5) Backflow preventers and assemblies,
- 6) Fire hydrants, and
- 7) Fire department connections.

B. SHOP DRAWINGS

Submit shop drawings for the following:

- 1) Precast concrete vaults including frames and covers,
- 2) Drains,
- 3) Access hatches,
- 4) Wall sleeves,
- 5) Valve support stands,
- 6) Prefabricated above ground vaults, and
- 7) Backflow prevention devices.

1.5 QUALITY ASSURANCE

A. LATEST CODES AND STANDARDS

Materials and operations shall comply with the latest revision of all applicable Codes and Standards.

B. PIPE MARKINGS

Piping materials shall be marked clearly and legibly.

- 1) Ductile Iron Pipe shall show identification marks on or near bell as follows:
 - a. Weight,
 - b. Class or nominal thickness,
 - c. The letters “DI” or “Ductile,”
 - d. Manufacturer’s identifying mark,
 - e. Year in which pipe was made, and
 - f. Casting period.

- 2) Steel pipe shall be marked as follows. Each length of pipe and each special section shall be legibly marked by paint stenciling, die stamping, or hot-roll marking to show the following:
 - a. Manufacturer's name or mark,
 - b. Size and weight of the pipe or special section,
 - c. The type of steel from which the pipe or special section was made.
- 3) PVC Pipe shall show proper marking of pipe as required in the applicable product specification AWWA C900 or ASTM D2241 (2-inch) pipe and shall remain legible during normal handling, storage, and installation. The manufacture date of the pipe must be within 1 year of the date of installation. Marking of PVC pipe shall be applied at a maximum of 5-foot intervals and should include:
 - a. Manufacturer's name or trademark,
 - b. Nominal pipe size and outside diameter base,
 - c. PVC cell classification or material code (2 inch),
 - d. Dimension ratio or standard dimension ratio,
 - e. Product type (PVC), pressure class or pressure rating,
 - f. Standard specification designation (AWWA C900 or ASTM 2241), and
 - g. production run record or lot code.

C. ADDITIONAL STANDARDS

- 1) Comply with Factory Mutual's "Approval Guide" and Underwriters Laboratories, Inc. "Fire Protection Equipment Directory" for fire-service main products.
- 2) NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, and flushing and valve and hydrant supervision for fire mains.
- 3) Comply with NSF Standard 61 for materials for water service piping and specialties for domestic water.
- 4) Comply with all applicable AWWA and ANSI standards.

1.6 QUALITY STANDARDS

Materials and operations shall comply with the latest revision of the Codes and Standards listed below. The use of standard specification references without a year designation implies the most current applicable specification. Additional Reference Standards are listed in Section Introduction 1.5.

AASHTO	American Association of State Highway Transportation Officials.
ANSI	American National Standards Institute
AREMA	American Railway Engineering and Maintenance-Of-Way Association
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials

AWWA	American Water Works Association
DIPRA	Ductile Iron Pipe Association
FM	Factory Mutual System
FS	Federal Specifications
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NSF	National Sanitation Federation International
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SDS	Safety Data Sheet
UL	Underwriters Laboratories, Inc.
Uni-Bell	PVC Pipe Association

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. APPROVAL OF MATERIALS

Materials used for the construction of water mains and appurtenances in OWASA's water distribution system shall be new, free of defects, and meet the highest standards set forth. An authorized OWASA representative must inspect, review, and approve all materials to be used for water lines and appurtenances prior to installation. At the option of OWASA, any material installed without inspection will have to be sufficiently removed for inspection and review. Any additions, deletions, or changes from the OWASA approved plan set must be submitted to OWASA's Engineer for approval, prior to making changes in the field.

B. PIPE CONDITION/PIPE EXAMINATION

- 1) **New Pipe Inspection:** Inspect each truckload of materials thoroughly upon arrival at the site. Examine material for damage and to ensure that the right pipe has been delivered to the site. Pipe shall be protected during handling against impact shocks and free fall. Care shall be taken when unloading pipe to avoid damaging the pipe lining. Pipe that has been damaged either in transit or during unloading shall be plainly marked and shall not be used in the construction of the utility. Pipe shall be kept clean at all times, **shall be stored on racks so that pipe is not on the ground**, and no pipe shall be used in the work that does not conform to the appropriate ASTM specifications. **PVC pipe stored onsite shall be covered if not installed within 180 days.**
- 2) **Pre-Installation Inspection:** Prior to being installed, each section of the pipe shall be carefully examined for damage and conformity with these specifications. All pipe in which spigots and bells cannot be made to fit properly, or pipe, which has

chipped bells or spigots, will be rejected. **PVC pipe which has discolored shall not be installed.** All pipes damaged or deemed not to conform to these specifications, shall be plainly marked and shall not be used in the construction of the utility. The faces of all spigot ends and all shoulders on the bells must be true, without lumps or rough edges, and be brought in fair contact. Examine bell and spigot for uniformity and smoothness of liner and barrel.

- 3) Inspect fittings and structures thoroughly upon arrival for damage. Remove damaged or rejected materials from site.

C. STORAGE AND HANDLING

- 1) Observe manufacturer's directions for handling, delivery, and storage of materials and accessories.
- 2) Protect pipe coating during handling using methods recommended by the manufacturer. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
- 3) Protect stored piping from entry of water or dirt into pipe. Store pipe on shoulders and not in ditch lines. String out no more pipe than can be installed in a day. Also, protect bells and flanges of special fittings from entry of moisture and dirt. If pipe is provided with end protectors, do not remove protectors until ready for installation or for inspection. Once inspected, replace protectors.
- 4) Support pipe to prevent sagging or bending.
- 5) Use slings to handle valves and fire hydrants if size requires handling by crane or other type of lift. Do not use handwheels or stems to lift or for rigging points.
- 6) Store fire hydrants and valves in such a way as to prevent entry of water and dirt into openings. Support on skids or pallets off the ground or pavement. If fire hydrants or valves are provided with end protectors, do not remove protectors until ready for installation or for inspection. Once inspected, replace protectors. Protect valves against damage to threaded ends or flanges.

1.8 PRODUCT SUBSTITUTIONS

OWASA's Engineer will approve materials not specified but deemed equal, on a case-by-case basis. OWASA's Product and Design Review Committee (PDRC) meets on an "as-needed" basis to evaluate new products for incorporation into these specifications. If submitting new products, submit in writing 60 days prior to meeting date. Documentation and samples of materials must be submitted to OWASA. New materials approved for the water distribution system will be incorporated into these specifications after approval by the PDRC.

1.9 PROJECT CONDITIONS – SEPARATION OF WATER AND APPURTENANCES FROM SANITARY SEWERS AND OTHER STRUCTURES

Follow the NCDEQ and OWASA standards, whichever is more stringent, for separation of water mains and sanitary sewers lines.

A. PARALLEL INSTALLATIONS

- 1) **Preferred/Normal Condition** – water lines shall be constructed at least 10 feet horizontally from an **existing or proposed** sewer or sewer manhole whenever possible. The distance shall be measured edge-to-edge.
- 2) **Unusual Conditions** – when **preexisting** local conditions prevent a horizontal separation of at least 10 feet, OWASA may approve the water line to be laid closer to a sewer or sanitary sewer manhole , provided that:
 - a. The water main shall be placed in a separate trench, with elevation of the bottom of the water line at least 18 inches above the top of the sewer; or
 - b. The water main shall be placed in the same trench as the sewer, and located to one side, on a bench of undisturbed earth, and the elevation of the bottom of the water main shall be at least 18 inches above the top of the sewer; or
 - c. Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA-approved Ductile Iron Pipe pressure tested in place to 150 psi without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place.

B. WATER MAINS CROSSING ABOVE SEWERS

- 1) **Preferred/Normal Condition:** Water lines shall be constructed to cross over sewers whenever possible and shall be laid to provide a vertical separation of at least 18 inches between the bottom elevation of the water line and the top of the sewer.
- 2) **Unusual Conditions:** When **preexisting** local conditions prevent an 18-inch vertical separation as described in *Water Mains Crossing Above Sewers, Preferred/Normal Condition* (paragraph above), the following construction shall be used:

Both the sewer and water line itself shall be constructed of AWWA- approved Ductile Iron Pipe with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.

C. WATER MAINS CROSSING BELOW SEWERS

Unusual Conditions: When **preexisting** local conditions prevent an 18-inch vertical separation, as described in paragraph B, *Water Mains Crossing Above Sewers, Preferred/Normal Conditions*, above, with OWASA approval, the following construction shall apply:

- 1) That the section of the water pipe is centered at the point of the sewer crossing so that water pipe joints shall be equal distant and as far as possible from the sewer such that, for a 90-degree crossing, the water main joints are a minimum of 10 feet on each side of the point of crossing.
- 2) Provide adequate structural support for the sewers to prevent excessive deflection of the joints, which can result in settling on and/or breaking the water line.

- 3) The sewer main shall be designed and constructed of ferrous pipe **designed to water main standards, centered on the crossing**, and pressure tested at 150 psi (reference minimum design criteria for the permitting of gravity sewers) to assure water tightness prior to backfilling, or either the water main or sewer main be encased in a water-tight carrier pipe which extends 10 LF beyond both sides of the crossing. These options shall comply with 15A NCAC 2T regulations Section .0305.

D. WATER MAINS AND APPURTENANCES FROM OTHER UTILITIES OR STRUCTURES

- 1) **Horizontal Separation – Preferred/Normal Condition:** Water lines shall be constructed to provide at least 3 feet of horizontal separation from other utilities whenever possible. The distance shall be measured edge-to-edge along the vertical plane. For Asbestos Cement, **gas mains, and reclaimed water** lines, provide a minimum 5 feet of clear horizontal separation.

For buildings or other permanent structures, a minimum of 15 feet of clear horizontal separation, including roofs and building foundations, shall be provided for mains up to 15 feet deep. Separations for water mains greater than 15 feet deep, larger than 12-inch diameter, or where incapable of meeting separation requirements due to preexisting site constraints will be evaluated on a case-by-case basis.

Other Separations

Meter vaults	10 feet
Fire hydrants	10 feet
Air release valve	10 feet
Underground Stormwater	
Control Measures	10 feet*
Permeable pavers	5 feet*
Meter boxes	5 feet
Blowoff assembly	5 feet
Other appurtenances	5 feet

***Note:** If separations from underwater stormwater control measures and permeable pavers cannot be maintained, OWASA may consider allowing construction in accordance with creek crossings as an alternative.

- 2) **Vertical Separation – Preferred/Normal Condition:** whenever it is necessary for another utility to cross a water main, a 12-inch vertical separation shall be maintained between the lines. **Separation of 18 inches is required for reclaimed water lines.** When **preexisting** local conditions prevent a 12-inch vertical separation, the following construction shall apply:

Provide adequate structural support for the utility to prevent excessive deflection of the joints, which can result in settling on and/or breaking the water line.

E. SANITARY SEWER MANHOLES

No water mains shall pass through or come in contact with any part of a sewer manhole. A minimum of 10 feet of horizontal separation shall be maintained between water mains and sanitary or combined sewer manholes provided that the applicable

provisions of Paragraph A, *Parallel Installations, Unusual Conditions*, above, are also met.

F. NEW UTILITIES AND EXISTING WATER MAINS

When installing a new utility adjacent to or in close proximity to an *existing* water main, the new utility line shall be installed to provide the minimum horizontal and vertical clearances specified in paragraph D, *Water Mains and Appurtenances Other Utilities or Structures*.

1.10 LOCATING SERVICES

Contact “**NC One Call**” 1-800-632-4949 or the National Three Digit “Call Before You Dig” 811 three days, excluding weekends and holidays, before digging.

1.11 COORDINATION

- A. Coordinate tie-in to all water mains with OWASA’s Engineer. OWASA will be the sole operator of all valves and hydrants on the OWASA water distribution system.
- B. Contact OWASA Construction Inspector, Distribution and Collection Systems Division, or OWASA Project Manager to coordinate interruption of service, operation of valves, line cut-ins, or placement of a tapping sleeve and valve. If interruption is necessary, the interruption shall be arranged to occur at such a time to cause the least disruption and minimize loss of service. At the direction of OWASA’s Engineer, temporary service may be required to be provided. Provide a minimum of 10 working day notice of the proposed utility interruption for necessary operation of valves.

PART 2 – PRODUCTS

2.1 PIPE AND FITTINGS

NOTICE: The use of STANDARD GASKETS WITH PUSH-ON PIPE IS NO LONGER PERMITTED for sizes less than 16 inches.

The following references provide the minimum standards as they apply to the specific item listed. In all cases, the latest revision shall apply.

A. DUCTILE IRON PIPE

Ductile iron pipe shall be manufactured in accordance with all applicable requirements of AWWA C151/ ANSI A21.51 for 4-inch and larger diameter pipe; pressure class rated, Class 350, minimum (see **Section 3 – Water & Sewer Design**); and shall be in 18 or 20-foot lengths; unless otherwise approved. The thickness of Ductile Iron Pipe shall be determined by considering trench load and internal pressure (*the pressure zone and variances in which the pipe will be used*) separately in accordance with AWWA C150/ANSI A21.50.

The ductile iron pipe shall be cement-mortar lined with a seal coat in accordance with AWWA C104/ANSI A21.4. Outside coat shall be a minimum of 1-mil bituminous paint according to AWWA C151/ANSI A21.51.

Each joint of ductile iron pipe shall be hydrostatically tested before the outside coating and inside lining are applied at the point of manufacturer to 500 psi. Testing may be performed prior to machining bell and spigot. Failure of ductile iron pipe shall be defined as any rupture or leakage of the pipe wall.

All materials used in production of the pipe are to be tested in accordance with AWWA C151 for their adequacy within the design of the pipe, and certified test results are to be provided to OWASA upon request. All certified tests, hydrostatic and material are to be performed by an independent testing laboratory at the expense of the pipe manufacturer.

- 1) Push-on and mechanical joint pipe shall be as manufactured by the American Cast Iron Pipe Company, United States Pipe and Foundry Company, McWane Ductile, or approved equivalent.

2) Ductile Iron Joints

Pipe joints shall be restrained by either mechanical joint or manufactured restrained joint system, as outlined in (c) below. The use of restraining gaskets shall be permitted. This applies to all pipe sizes 4 inch through 12 inch. Pipe 16 inch and larger shall be as approved by the OWASA Engineer. Acceptable types of pipe joints are as follows:

- a. **Push-on Joint, Ductile Iron Pipe THE USE OF STANDARD PUSH-ON GASKETS IS NOT PERMITTED!** The pipe shall conform to AWWA C151/ANSI A21.51 (such as "Fastite" or "Tyton"). The dimensions of the bell, socket, and plain end shall be in accordance with the manufacturer's standard design dimensions and tolerances. The gasket shall be of such size and shape to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal. Gaskets shall be manufactured of an acceptable elastomeric material, and comply with AWWA C111/ANSI A21.11 and shall be **as manufactured by American Pipe (Fast-Grip), US Pipe (Field Lok 350), or McWane Ductile (Sure Stop 350).**

b. Mechanical Joint, Ductile Iron Pipe, and Tee Bolts

- i. The mechanical joint shall consist of:
 - a) A bell cast integrally with the pipe or fitting and provided with an exterior flange having cored or drilled bolt holes and interior annular recesses for the sealing gasket and the spigot of the pipe or fitting;
 - b) A pipe or fitting spigot;
 - c) Rubber EPDM material and comply with AWWA C110/ANSI A21.11 sealing gasket;
 - d) Separate ductile iron follower gland having cored or drilled bolt holes; as outlined in d. below.
 - e) Stainless steel Tee Head bolts and hexagon nuts. All threads are Coarse-Thread Series Class 2A, External and Class 2B, Internal, per ANSI B1.1. Nuts to be furnished in accordance with ASTM F594. Use

of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.

- ii. The joint shall be designed to permit normal expansion, contraction, and deflection of the pipe or fitting while maintaining a leak proof joint connection. The mechanical joint shall conform to the requirements of Federal Specification WW-P-421, AWWA C111/ANSI A21.11, and ASTM A536.
 - iii. **Tee Bolts and Nuts:** All tee bolts shall be 304 or 316 stainless steel with either a coated heavy hex nut, or the use of stainless steel anti-seize compound, to prevent galling. Bolts shall conform to AWWA C111/ANSI A21.11. This requirement supersedes all other bolt references in the standard. Only bolts and nuts that are 304, or 316, stainless steel shall be permitted for use in the OWASA jurisdiction.
 - iv. **Mechanical Joint Bolt Torque:** See Section 3.1.A, paragraph 2, item a, *Installing Mechanical Joint Pipe*, below.
- c. **Mechanical Joint Restraint:** Acceptable types of joint restraints shall be:
- i. Restrained Joints shall consist of the use of a wedge action joint restraint system, using: Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc.; Ford wedge action restrainer gland UFR Series 1400; Sigma One-Lok; Tyler Union TUF Grip; Star Grip 3000; SIP EZ Grip; or approved equal. Bolt heads are to be “auto-torque” twist off. Auto-torque twist off bolts are exempt from the stainless steel requirement. See Standard Detail 512.08, sheet 2 of 2 for figure.
 - ii. Restrained Joint Pipe shall be TR Flex or Lok Tyte as manufactured by United States Pipe and Foundry Company, Flex-Ring or Lok-Ring as manufactured by American Cast Iron Pipe Company, or approved equal.
 - iii. Concrete thrust blocking and rodding is required for connection to all existing water mains or as shown on plans.
- d. **Flanged Joints** shall be firmly bolted with machine bolts; however, where valves or special fittings are attached to a flange pipe, stud or tap bolts may be used, providing the number used and diameter for each joint is the same for each respective size of pipe, specialty, or valve, as recommended by the latest AWWA Standard for flanged drilling. Bolts are specified in ANSI B18.2.1 and nuts are specified in ANSI B18.2.2. Bolts and nuts are to be cold worked 304 stainless steel meeting ASTM F593 for sizes up to 1.5 inches. **Use of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.** Stainless steel bolts and nuts shall have a minimum yield strength of 50,000 psi. For high strength applications, use 304L stainless steel bolts. Bolts shall be of sufficient length to pass through two flanges and the nut threads shall be accurately cut, close fitting, and the prevailing standard. Bolt heads shall be cut square and nuts hexagon in shape, both the heads and nuts being chamfered. Gaskets to be of 1/8-inch thick rubber (EPDM or approved elastomer) per AWWA C110/ANSI A21.10 or equal as approved by OWASA's Engineer.

3) DUCTILE IRON FITTINGS

Fittings shall be ductile iron, grade 70-50-05, and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 for compact fittings, pipe sizes 4 inches through 48 inches with the exception of manufacturer's proprietary design dimensions and thicknesses for iron, in accordance with AWWA C110/ANSI A21.10. All ductile iron fittings shall have a minimum working pressure rating of 350 psi and shall be cement-mortar lined and bituminous coated (minimum 1-millimeter), in accordance with AWWA C104/ANSI A21.4. The fittings shall be tested and the manufacturer shall provide certified test results when requested by OWASA. This testing shall include hydrostatic proof testing of fittings. Glands, gaskets, and bolts shall conform to AWWA C111/ANSI A21.11. The use of push on fittings is not permitted. Acceptable manufacturers are: American Cast Iron Pipe Company, Union/Tyler Pipe Company, or U. S. Pipe & Foundry Company, Star Pipe Products, or SIP Industries. Acceptable types of fittings are:

- a. **Full Body Mechanical Joint Fittings:** Full body ductile iron mechanical joint fittings shall be class 250 minimum and shall conform to AWWA C110/ANSI A21.10. Glands, Gaskets and Bolts shall conform to AWWA C111/ANSI A21.11.
- b. **Mechanical Joint Fittings – Compact:** Compact fittings shall be minimum class 350 and shall comply with AWWA C153/ANSI A21.53, pipe sizes 4 inches through 48 inches. Glands, Gaskets and Bolts shall conform to AWWA C111/ANSI A21.11.
- c. **Mechanical Joint Restraints:** Joint restraints shall consist of the use of a wedge action joint restraint system using: Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc.; Ford wedge action restrainer gland UFR Series 1400; Sigma One-Lok; Tyler Union TUF Grip; Star Grip 3000; SIP EX Grip; or approved equal. Bolt heads are to be “auto-torque” twist off. Auto-torque twist off bolts are exempt from the stainless steel requirement. See Standard Detail 512.08, sheet 2 of 2 for figure.

B. COPPER TUBE

Copper pipe shall meet ASTM B88.

$\frac{3}{4}$ " and 1" copper pipe shall be Type "K" soft drawn copper pipe with **brass AWWA C800 flare as manufactured by Ford or Mueller, or equivalent.** See Standard Detail 515.01 and 515.02, sheets 1 and 2.

2" copper pipe shall be Type "K" hard drawn copper.

Connections and fittings shall be brazed with Silvalloy, Excel, SilFos, or approved equal comprised of 15% silver. Brazing temperature shall be between 1,300- and 1,500-degrees Fahrenheit.

C. PVC PIPE

PVC pipe larger than 2 inches or smaller than 2 inches in diameter is not permitted for use in the OWASA service area. Pipe older than one (1) year is not permitted for use. Joints in 2-inch pipe shall be bell-end with gasket. PVC water pipe meeting ASTM D2241, SDR 21, class 200 minimum for pipe 2-inches in diameter. Pipe design shall also meet AWWA M23, latest revision.

D. STEEL CASING PIPE

- 1) **Steel Casing Pipe:** Pipe shall be high strength steel, spiral welded or smooth-wall seamless manufactured in accordance with ASTM A139 and ASTM A283 and consisting of grade “B” steel with a minimum yield strength of 35,000 psi. All encasement pipes shall meet the applicable NCDOT, Municipal, or AREMA specifications but shall be no less than 6 inches larger than the outside diameter of the carrier pipe bell. The steel pipe shall be capable of withstanding the design load. No interior lining and exterior coating shall be required except that all exposed metal is to be coated with epoxy or asphaltic material. Casing pipe shall include pipe carriers (Spiders) to support carrier pipe. The steel encasement pipe shall be of leak-proof construction and shall include end caps.
- 2) **Spiders/Skids for Encasement Pipes:** Spiders shall be placed at the bell of each carrier pipe within a steel encasement. **Bare, coated, or stainless steel Spiders/Skids with EPDM skids or skids of the same material as the spiders with a nylon shoe** shall be as manufactured by ITT Grinnell, Charlotte, NC; Spider Manufacturing, Durham, NC; Advanced Products & Systems (APS) model SSI with EPDM skids, Lafayette, LA, or approved equal. See Standard Detail 517.01. For bolted connections, bolts shall be 304 ASTM F593 stainless steel. **Use of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.**
- 3) **Steel Casing End Seals:** Casing end seals shall be 1/8” thick synthetic rubber seamless pull-on end seals with T-304 stainless steel banding with 100% non-magnetic worm gear mechanism. End seals shall permit pipe movement while maintaining a seal. Acceptable manufacturers are: Advance Products & Systems, Inc., Lafayette, LA, or equal.

E. TUNNEL LINERS AND APPURTENANCES

- 1) Grout mix for filling voids in between carrier pipe and tunnel shall consist of the following materials properly mixed in proportions by weight.
 - a. 1.0 Part Cement.
 - b. 3.0 Parts Fine Sand, 100 Percent Shall Pass No. 16 Sieve.
 - c. 0.5 to 0.6 Part Water.
- 2) Tunnel lining construction shall comply with the “Specification for Steel Tunnel Liner Plates” in the AREMA *Manual for Railway Engineering*. The design and shape of the liner plates shall be such that erection and assembly of the liner plate structure can be completely and readily effected from inside the tunnel. Plates shall be accurately curved to suit the tunnel cross section, and all dimensions shall be of the size and accuracy that plates of similar curvature shall be interchangeable. All plates shall be connected by bolts on both longitudinal and circumferential joints.
- 3) The steel lining shall consist of plates 16, 18, or 24 inches wide. Each circumferential ring shall be composed of the number and length plates necessary to complete the required shape shown on the drawings. The nominal tunnel diameter shall be of sufficient size to install the carrier pipe.

- 4) Plates shall be one-piece steel meeting the requirements of ASTM A1011 or ASTM A1008. Plates shall have an ultimate tensile strength of at least 42,000 psi and yield strength of 28,000 psi. Gage thickness shall be a minimum of 8 gauge. The liner plate and bolts shall be galvanized in accordance with ASTM A153. In addition, the liner plates shall be asphalt coated to meet AREMA *Manual for Railway Engineering*. For two flange plates, the minimum thickness shall be 0.135 inches. Plates shall be manufactured by Armco Steel Corporation, Commercial Shearing, Incorporated, Republic Steel Corporation, or equal.
- 5) Grout holes 1½ inches or 2 inches (or larger) in diameter shall be provided in each ring to permit grouting as the erection of the tunnel liner plates progresses. Grout hole screw plugs shall be provided in plates.
- 6) Steel bolts shall meet requirements of ASTM A449 for plate thickness equal to or greater than 0.209 inch and ASTM A307 for plate thickness less than 0.209 inch. The nut shall meet requirements of ASTM A307, Grade A.
- 7) Steel bolts shall meet requirements of ASTM A449 for plate thickness equal to or greater than 0.209 inch and ASTM A307 for plate thickness less than 0.209 inch. The nut shall meet requirements of ASTM A307, Grade A.

F. CARRIER PIPE FOR CASINGS AND TUNNELS

Carrier pipe shall be ductile iron restrained joint pipe of the class indicated on the drawings, unless otherwise approved by the OWASA engineer.

G. POLYETHYLENE PIPE

- 1) **USED ONLY AT THE DIRECTION OF THE OWASA REPRESENTATIVE.** All polyethylene pipe, tubing, and fittings shall conform to all applicable provisions and requirements of the latest revision of AWWA C901, AWWA C906, or CSA B137.1 and, by inclusion, all appropriate standard references therein. Polyethylene compounds utilized in the manufacture of products furnished under this specification shall have a grade of PE24 with a minimum cell classification of PE 234343(C, D, or E) for PE2406 materials, or a grade of PE34 with a minimum cell classification of PE 345444(C, D, or E) for PE3408 materials, as defined in ASTM D3350. In conformance with AWWA C901, AWWA C906, or CSA B137.1, they shall have a PPI recommended Hydrostatic Design Basis (HDB) of 1250 psi (PE2406) or 1600 psi (PE3408) at a temperature of 73.4°F (23°C).

All materials that come in contact with water, including lubricants, shall be evaluated, tested, and certified for conformance with ANSI/NSF Standard 61.

Clean re-work material of the same type grade, and cell classification generated from the manufacturer's own pipe and fitting production may be used by the same manufacturer as long as the pipe, tubing, and fittings produced meet the requirements of AWWA C901, AWWA C906, or CSA B137.1.

2) Reference Standards

AWWA C515: *Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service*

AWWA C901: Polyethylene (PE) Pressure Pipe and Tubing, 1/2-inch through 3-inch for Water Service.

AWWA C906: Polyethylene (PE) Pressure Pipe and Tubing, 4-inch through 63-inch for Water Service.

ASTM D2657: Standard Practice for Heat Joining Polyolefin Pipe and Fittings.

ASTM D2683: Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.

ASTM D2837: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

ASTM D3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.

ASTM F1055: Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

PPI TR-3: Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.

PPI TR-4: Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fitting Compounds.

ANSI/NSF: Standard 61 for Drinking Water Systems Components – Health Effects.

NSF Standard #14: Plastic Piping Components and Related Materials.

CSA B137.1: Polyethylene Pipe, Tubing, and Fittings for Cold Water Pressure Services.

3) **Qualification Of Manufacturers:** The manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications. Given reasonable notice, the manufacturer's production facilities shall be open for inspection by OWASA or their representative. Qualified manufacturers shall be approved by the Project Engineer. Approved manufacturers include Plexco Performance Pipe Division-Chevron Chemical Company.

4) **Manufacturer's Quality Control:** The manufacturer of the Polyethylene pipe and fittings shall have an established quality control program responsible for inspecting incoming and outgoing materials. Incoming polyethylene materials shall be inspected for density, melt flow rate, and contamination. The cell classification properties of the material shall be certified by the supplier. Incoming materials shall be approved by Quality Control before processing into finished goods. Outgoing products shall be tested as required in AWWA C901 or AWWA C906, as applicable.

5) **Pipe And Tubing:** Pipe and tubing furnished under this specification shall be manufactured using compounds complying with the requirements of paragraph A

above. Dimensional performance characteristics shall conform to the requirements of AWWA C901, C906, or CSA B137.1. The pipe's DR (Dimension Ratio) and Working Pressure (WPR) shall be as specified or shown on the drawings.

- 6) **Fittings:** Polyethylene fittings furnished under this specification shall be manufactured using compounds complying with the requirements of paragraph A above and all appropriate requirements of AWWA C901, C906, or CSA B137.1. Socket type fittings shall comply with ASTM D2683. Butt fusion fittings shall comply with ASTM D3261. Electrofusion fittings shall comply with ASTM F1055. Mechanical fittings produced from material not listed in paragraph A, above, shall be approved only after submission of appropriate test data and service histories indicating their acceptability for the intended service. In all cases, the specifications and requirements of the fittings supplied shall comply with the appropriate section of AWWA C901, C906, or CSA B137.1.
- 7) **Pressure Class:** The Pressure Class of the Polyethylene pipe and fittings shall be specified on the basis of the Working Pressure Rating of the water system as defined in AWWA C906. Recurring positive pressure surges of up to one half of the pipe's nominal pressure class and occasional pressure surges of up to 100% of the pipe's nominal pressure class may be ignored due to the fatigue endurance of the polyethylene materials. Non-polyethylene fittings shall be specified and used in accordance with the surge tolerance of the particular appurtenance in use.
- 8) **Marking:** Pipe and tubing shall be marked in accordance with either of AWWA C901, AWWA C906, or CSA B137.1, whichever applies. Marking shall be legible and shall remain legible under normal handling and installation practices. Indent marking may be utilized provided; 1) the marking does not reduce the wall thickness to less than the minimum value for the pipe or tubing, 2) it has been demonstrated that these marks have no effect on the long-term strength of the pipe or tubing and, 3) the marks do not provide leakage channels when elastomeric gasket compression fittings are used to make the joints.

Fittings shall be marked on the body or hub. Marking shall be in accordance with either ASTM D2683, ASTM D3261, AWWA C906, or ASTM F1055, depending on fitting type and the standard that applies. Mechanical fittings shall be marked with size, body material designation code, pressure rating, and manufacturer's name or trademark.

- 9) **Workmanship:** Pipe, tubing, and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, blisters, dents, or other injurious defects. The pipe, tubing, and fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

2.2 VALVES AND FIRE HYDRANTS

A. GATE VALVES

- 1) **Gate Valves, Resilient Wedge (2 inches through 12 inches):** All gate valves shall be iron body of the resilient wedge type complying with AWWA C509 or AWWA C515 and shall be UL listed and FM approved for a working pressure of 200 psi. All internal parts shall be accessible without removing the body from the line. The wedge shall be of cast iron completely encapsulated with resilient

material. The resilient sealing material shall be permanently bonded to the cast iron wedge with a rubber-tearing bond to meet ASTM D429 and AWWA C550.

Non-Rising Stems (NRS) shall be cast bronze with internal collars in compliance with AWWA. OS&Y stems shall be bronze. The NRS stuffing box shall have two "O"-Ring seals above the thrust collar. These rings shall be field replaceable without removing the valve from service.

Each valve shall be hydrostatically tested at 400 psi to the requirements of both AWWA and UL/FM.

All gate valves 4 through 12 inches shall be of the mechanical joint type. 2-inch gate valves shall be iron pipe threads.

All bolts and nuts shall be stainless steel. **Use of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.**

Valves shall open counter-clockwise (left) and shall be equipped with a 2-inch square AWWA operating nut.

The valve body and bonnet shall be coated interior and exterior with fusion bonded thermosetting plastic or epoxy. **ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER.**

Acceptable gate valves, sizes 4-inch through 12 inches, shall be:

Manufacturer	Model
American Flow Control	Series 2500SS
Clow (M&H)	F-6100
Mueller	A-2360-20

All resilient seat gate valves furnished for a project shall be from the same manufacturer.

- 2) **Gate Valves, Resilient Wedge (16 inches and larger):** Valves shall be iron body of the resilient wedge type complying with AWWA C509 and shall be UL listed and FM approved for a working pressure of 250 psi. Valves shall meet or exceed the requirements of AWWA C515. Valve body, bonnet, wedge, and operating nut shall be constructed of ductile iron. The exterior of the ductile iron wedge shall be fully encapsulated with rubber. The resilient sealing material shall be permanently bonded to the ductile iron wedge with a rubber-tearing bond to meet ASTM D429 and AWWA C550. Buried and non-buried valves shall have all internal and external surfaces of the valve body and bonnet shall have a fusion-bonded epoxy coating complying with AWWA C550, applied electrostatically prior to assembly.

Non-Rising Stems (NRS) shall be cast bronze with internal collars in compliance with AWWA. Stem and stem nut shall be high-strength bronze. Stem shall be sealed by three O-rings. The NRS stuffing box shall have the top two O-ring seals shall be replaceable with valve fully open and while subject to full rated working pressure. O-rings set in a cartridge shall not be allowed. Valve shall have thrust washers located with 1 above and 1 below the thrust collar to ensure trouble-free operation of the valve.

Each valve shall be hydrostatically tested at 500 psi to the requirements of both AWWA and UL/FM.

All gate valves (16" and larger) shall be of the flanged joint type.

Valves 16" and larger of the MJ type will require written approval from the OWASA engineer.

All bolts and nuts shall be stainless steel. **Use of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.**

Valves shall open counter-clockwise (left), be equipped with operational assist with a 2-inch square AWWA operating nut. This can be in the form of a Spur or Bevel gear. Bevel gear will require additional engineering for detail. Or can come in the form of a bypass assembly. Bypass assembly will require additional engineering for detail. All rubber gaskets and O-rings shall be manufactured with an approved elastomer.

Gate valves 16" and larger **and installed at standard depths shall be installed with a valve box to access the valve nut. See Standard Detail 513.01. Gate valves at excessive depth, as determined by OWASA, shall be installed in a manhole. See detail 513.08.**

Acceptable gate valves, sizes 16 inches and larger, shall be:

Manufacturer	Model
American Flow Control	Series 2500 w/options
Mueller	A-2361 w/options
Clow (M&H)	F-6100

All resilient seat gate valves furnished for a project shall be from the same manufacturer.

- 3) **Insertion Valves:** Insertion valves shall meet requirements of gate valves specified above for valve mechanism and AWWA C110/ANSI A21.10 for the sleeve for pressure ratings shown on the drawings.
- 4) **Gate Valves Smaller Than 3 Inches** shall be resilient seat, solid wedge, inside screw, non-rising stem, bolted bonnet, stainless steel bolts, and threaded ends. All valves shall be furnished with a 2-inch operator nut and open left. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. Acceptable gate valves are:

Manufacturer	Model
American Flow Control	2502SS Series
Clow (M&H)	F-6103
Mueller	H-2360-8

B. COMBINATION AIR VACUUM VALVE

Automatic Air and Vacuum Valves shall be infinitely variable automatic air and vacuum valves designed to allow escape of air, close watertight when liquid enters the valve and allow air to enter in the event of a vacuum. The valve shall be an NPT threaded Stainless Steel body. The valve outlet is to be protected from debris entering the outlet of the valve. Valves shall be all brass. Valves shall be designed for a maximum cold water pressure of 200 psig. Combination air and vacuum release valves shall be located as shown on the drawings or as otherwise directed by OWASA's Engineer. The valve shall be housed in a precast concrete eccentric manhole and shall be installed in accordance with Standard Detail 538.01. Acceptable Models are, X-Series (1- or 2-inch outlet) by Crispin-Multiplex Manufacturing Co. and 986 Stainless Steel by H-Tec Inc.

Size	Manufacturer	Model
2-inch	Crispin	Type X Series
2-inch	H-Tec	986 Stainless Steel

Manhole units shall consist of standard modular precast riser sections, modular riser sections, and a doghouse base. Where conditions do not favorably accommodate the use of an eccentric cone, eccentric precast reinforced concrete flat tops are to be used. See Standard Details 513.04 and 513.05.

C. BUTTERFLY VALVES

Butterfly valve applications 16 inches and larger, shall meet AWWA C504. See Standard Detail 513.06. OWASA's Engineer must approve the installation of 16-inch and larger butterfly valves. Valves shall be short body and rated at no less than 250 psi.

Valves shall be flanged joint in accordance with AWWA C111. Accessories (bolts, glands, and gaskets) shall be supplied by the valve manufacturer.

All bolts shall be stainless steel. **Use of a stainless steel anti-seize compound is required or specially coated nuts to prevent galling.**

Valve operators shall meet the requirements of AWWA C504 and shall be of the traveling-nut type, sealed, gasketed, and lubricated for direct-bury underground service. Valve operators shall be sized for the pressure indicated on the drawings. Operator shall be capable of withstanding an input torque of 450 ft-lbs at full open or closed position, without damage to the valve or valve operators.

Valves shall be factory tested in accordance with Section 5 of AWWA C504 specification. Upon request the manufacturer shall furnish certified copies of test reports.

Valves shall open counter-clockwise (left) and shall be equipped with a 2-inch square AWWA operating nut and have a 4 to 1 gear ratio.

Valves shall be coated interior with fusion bonded thermosetting plastic, rubber, or epoxy. The exterior of buried valves shall be epoxy coated per AWWA C550 standard. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER.

Acceptable butterfly valve manufacturers are:

Manufacturer	Model
Clow (M&H)	4500-02(250 psi) FLG by FLG
Mueller / Pratt	Linseal XP 250B FLG by FLG / Triton HP250 FLG by FLG
DeZurik	BAW/EPDM (250 psi) FLG by FLG

All Butterfly valves furnished for a project shall be from the same manufacturer.

Butterfly valves 16 inches and larger and installed at standard depth shall be installed with a valve box to access the valve nut. See Standard Detail 513.01. Butterfly valves that are at excessive depth, as determined by OWASA, shall be placed in a precast concrete manhole. See Standard Detail 513.06.

D. CHECK VALVES

All swing check valves used for pressure zone separation shall be iron body, with a disc of extra heavy cast iron, ASTM A126 construction, bronze mounted with either mechanical joint or flanged ends as noted on the drawings. Standard mechanical joint ends shall be furnished with bolts, glands, and rubber gaskets. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. Flanged ends shall be provided with bolts and gaskets. The shaft shall be of 304 stainless steel and the seat ring shall be of bronze with an easily replaceable resilient disc seat. The valve shall be tight seating.

Check valves shall be non-slamming (such as shock absorber) type. All valves shall have a minimum non-shock cold-water pressure rating of 250 psi.

Flanged check valves shall meet the dimensional requirement of ANSI B16.1 and meet or exceed the requirements of ANSI/AWWA C508.

When more positive control is needed a lever-and-spring may be specified.

When check valves are used in vault applications, a ball drip valve is to be provided.

All check valves shall be furnished with an arrow cast into the body indicating the direction of flow during system operation.

Acceptable manufacturers are:

Manufacturer	Model
G.A. Industries	Model 250-U
American Flow Control	Series 2100

E. CROSS-CONNECTION CONTROL

Refer to OWASA Cross-Connection Control Ordinance, and Manual, latest revisions as applicable.

F. TAPPING SLEEVES AND VALVES

The tapping sleeve and valve shall be suitable for wet installation without interrupting water service.

- 1) **Iron Body Tapping Sleeve:** The sleeve body shall be of split type, full body ductile iron construction with mechanical joint ends and epoxy coating (10 mil minimum) for AC sleeves. The sleeve shall be suitable to fit the type and class of pipe being tapped. The mechanical joint type shall have longitudinal compound (EPDM) rubber gaskets that fit against the rubber end gaskets effecting a totally enclosed rubber, watertight seal. Side and end bolts shall be stainless steel. Tapping sleeve shall meet the requirements of AWWA C110/ANSI A21.10. For asbestos cement pipe, the Contractor shall measure the diameter of the pipe prior to selecting a tapping sleeve to ensure the sleeve will fit the pipe (this information shall be provided to OWASA on the as-built drawings). See Standard Detail 512.04.

Acceptable tapping sleeves are listed below:

Manufacturer	Model
American Flow Control	2800-C for CI to PVC 2800-A for AC
Mueller	H-615 for CI to PVC H-619 for AC
Tyler/Union	For CIP/DIP to DIP

- 2) **Tapping Valves:** Resilient seat tapping valves shall be epoxy coated (minimum 10 mil thickness) and otherwise meet the requirements of Section 2.2.A, *Gate Valves*, except that the seat openings shall be larger than nominal size with a raised alignment ring on the flange. Valve ends shall be mechanical joint by flange. Valves shall open counter-clockwise (left) and shall have a 2-inch operator nut. See Standard Detail 512.04.

All bolts and nuts are to be stainless steel.

Tapping valves shall be an "O" ring type mechanical joint end conforming to AWWA non-rising stem construction. Inlet flange end shall be Class 125 (ANSI B16.1). ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. Acceptable resilient seat tapping valves are listed below:

Manufacturer	Model
American Flow Control	2500 TM
Clow	F-6114
Mueller	T-2360

G. FIRE HYDRANTS

- 1) See **Standard Details** 514.02 and 514.03. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. ALL BRASS PRODUCTS SHALL BE LEAD FREE AND CONFORM TO NSF STANDARD 61-ANNEX G IN CONJUNCTION WITH NSF372 REQUIREMENTS. Fire hydrants shall comply with ANSI/AWWA C502, latest revision, UL 246 and FM1510. Hydrants shall be hub end, triple nozzle, improved AWWA type. Interior coating to be in accordance with AWWA C550. Minimum working pressure shall be 250 PSI working pressure in all pressure zones. Hydrants shall consist of the following:
 - a. Two 2½-inch fire nozzles and one 5-inch Storz connection nozzle (or OWASA-approved equivalent) with National Standard hose threads. The nozzle shall be an integral part of the fire hydrant and must be furnished by the manufacturer or authorized distributor designated by the manufacturer. Storz connector shall have the following characteristics: brass hydrant nozzle connection; have hard anodized aluminum Storz ramps and lugs (hydrant and cap side); and require a high-torque Storz spanner wrench in order for the cap to be removed.
 - b. All nozzles shall be provided with caps and chains.
 - c. The hydrant valve opening shall be 5¼ inches.
 - d. Bronze to bronze threads shall be provided between the hydrant seat or seat ring and the seating attaching assembly.
 - e. All hydrants must include cast or ductile epoxy lined shoe (minimum 4 mils), rubber drain seals and positive protective valve stop device.
 - f. Hydrants shall open left and shall have a National Standard pentagon-type operating nut (1 ½" point to flat). The operating nut shall be of one-piece bronze construction. A thrust washer shall be supplied between the operating nut and stem lock nut. The valve stem shall have a safety flange and a safety coupling.
 - g. Hydrants shall have a 6-inch hub-end or mechanical joint elbow.
 - h. The hydrant barrel shall be of sufficient length to provide a minimum bury of 4 feet.
 - i. Hydrants shall be of the compression type closing with line pressure and shall be of the traffic model breakaway type.
 - j. Hydrant cap and stuffing box shall be of unitized, one-piece design creating a watertight cavity without the use of gaskets. The combination of O-Rings to a crimped brass ferrule around the stem shall seal the cavity from contact with water. Hydrant caps shall have a means for providing periodic lubrication of the operating threads.
 - k. The main valve shall be of synthetic rubber reinforced with steel. The seat shall be of a bronze ring threaded to a bronze insert in the hydrant shoe, with O-Rings to seal the drain way and barrel from leakage of water in the shoe.
 - l. The hydrant drain hole shall momentarily force flush with each operation.
 - m. All hydrant extension kits, flange kits, stems, couplings or other repair parts must be of the original hydrant manufacturer. Only one 24-inch extension kit is allowed.
 - n. Hydrants are to be painted in accordance with Standard Detail 514.01. Barrels are to be painted red with the caps and bonnet painted reflective

silver. Private hydrants are to be clearly distinguishable from OWASA hydrants by painting with distinctly different paint colors, as prescribed by the local fire authority.

- o. If line is to be pressurized within 7 days of setting hydrant, then 4000-psi high early strength concrete shall be used.

Approved fire hydrants including model and manufacturer are listed below:

Manufacturer	Model
Clow (M&H)	F-2545 Medallion
Mueller	A-423 Super Centurion 250
American Flow Control	B62B Traffic Model (Long Barrel)

All hydrants furnished for a project shall be from the same manufacturer.

See Section 3.2.F, *Fire Hydrants* for installation requirements.

H. BLOW OFFS

- 1) **Blow-Off Assembly for Future Extension:** Blow-off assemblies for future extensions shall consist of two standard valve boxes, one for a NRS gate valve and one for a 2-inch brass pipe riser (see Standard Detail 514.05), thrust collar, a push-in plug tapped for 2-inches, a 2-inch brass pipe riser with a 2-inch threaded male threaded plug.
- 2) **Permanent Blow-Off Assembly:** Permanent blow-off assemblies shall consist of a standard valve box (see Standard Detail 514.06) with a concrete stabilizing pad, an NRS gate valve, a mechanical joint reducer as applicable, thrust collar, a riser with elbow and blocking, and if applicable, a flange 90-degree elbow placed above grade. See Standard Details 514.04 and 514.06.

I. CORPORATION STOPS

ALL BRASS PRODUCTS SHALL BE LEAD FREE AND CONFORM TO NSF STANDARD 61-ANNEX G IN CONJUNCTION WITH NSF372 REQUIREMENTS. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. Corporation stops for $\frac{3}{4}$ -inch and 1-inch taps only shall be all bronze CC tapered threaded inlet by flare copper as manufactured by Ford or Mueller. Acceptable corporation stops shall be the Ford FB600-(3 OR 34)-NL Series or the Mueller B25000N Series. 2-inch corporation or ball stops are not permitted. See Standard Detail 512.06.

2.3 MISCELLANEOUS APPURTENANCES

A. DETECTABLE WARNING TAPE AND TRACER WIRE

Tracer tape and tracer wire shall be installed per Section 02275.

B. DUCTILE IRON TRANSITION COUPLINGS

Transition couplings shall be ANSI/NSF Standard 61 Certified, fusion bonded powder epoxy coating and constructed of ASTM A536 grade 65-45-12 ductile iron flanges and middle ring. Coupling to be rated at a minimum of 200 psi working pressure per AWWA C219, and -20°F to 212° F. Gaskets shall be suitable for use on water and sewage. Bolts are to be stainless steel 18-8 Type 304. Transition couplings are to accommodate IPS PVC, C-900 PVC, Ductile Iron Pipe, Cast Iron, and Asbestos Cement Classes 100/150/200. Acceptable couplings are Smith-Blair Type 441 and 461, JCM 240 for line sizes 3-inch through 12-inch and the Dresser Style 253 Modular Cast Coupling (2-inch through 16-inch), Ford Style FC2W Ultra-Flex Ductile Iron Wide Range Coupling (4-inch through 12-inch), Hymax (Standard or Long body) coupling, Romac (Macro HP) coupling with EPDM gaskets. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER.

C. MISCELLANEOUS CONCRETE WORK

Concrete classes (NCDOT) to Design Compressive Strength at 28 days (f'c):

Concrete shall be constructed of a minimum of 3000 psi concrete at 28 days. Ready mixed concrete shall comply with ASTM C94. This applies to concrete blocking, valve box stabilizing pads, thrust collars, concrete encasement, and Fire Hydrant setting and thrust pads. All exposed concrete shall be air entrained.

D. BEDDING

Bedding material, when specified, shall be clean coarse aggregate No. 57, and shall meet the requirements of Section 1016-3, *Classifications* of the NCDOT *Standard Specifications for Roads and Structures*, latest revision for class VI stone.

E. PRECAST CONCRETE MANHOLE STRUCTURES

Structures of precast reinforced concrete manholes shall be designed and manufactured in accordance with ASTM C478, latest revision ("O" ring joints), or AASHTO M199 (gasketed joints). The standard joint shall be sealed with plastic cement putty meeting Federal Specification SS-C-153. An "O" ring or "mastic" joint seal may be used. The "O" ring joint shall conform to the requirements of ASTM C443. Type Concrete used in the construction of the manholes shall have a minimum 28-day compressive strength of 4000-psi air entrained (with 4 to 6 percent air) conforming to ASTM C33 and ASTM C94. Manholes shall have monolithic base and eccentric cone flat top as applicable. See Standard Details 513.04, 513.05, and 513.06. Structures are not permitted to have steps. Acceptable manufacturers are: Oldcastle Precast/N. C. Products Concrete Corporation, Stay-Right Tank, Lindsey Precast, Concrete Pipe and Precast, LLC (Hanson), Precast Solutions, Mack Industries or Tindall Precast Concrete Products, Inc.

Manhole Size Determination:

- 1) Unless shown otherwise, the minimum diameter of manholes shall be 5 feet.
- 2) Manholes with 16-inch diameter or larger pipe shall be a minimum of 6-foot diameter.

F. PRECAST UNDERGROUND CONCRETE UTILITY STRUCTURES

Structures of precast reinforced concrete shall be designed and manufactured in accordance with ASTM C858, latest revision with preformed butyl rubber joint sealant meeting ASTM C990, latest revision. Type Concrete used in the construction of the Utility Structures shall have a minimum 28-day compressive strength of 4000-psi air entrained (with 4 to 6 percent air) conforming to ASTM C33 and ASTM C94. Unless shown otherwise on the drawings, structures are not to have steps. Steel reinforcing shall conform to the requirements of ASTM C857, latest revision. Structures shall be designed for an H20-44 loading in traffic areas. Acceptable manufacturers are: Oldcastle Precast/N. C. Products Concrete Corporation, Lindsey Precast, Concrete Pipe and Precast, LLC (Hanson), Precast Solutions, Mack Industries, Tindall Precast Concrete Products, Inc. or M.C. Precast Concrete.

G. MANHOLE FRAME AND COVERS

Manhole frames and covers shall be meet ASTM, Class 30, traffic frame and cover as manufactured by Capitol Foundry, US foundry or East Jordan Iron Works. Cover shall read OWASA, "WATER" in the center and "DANGER ENTRY PERMIT REQUIRED" around the circumference. See Standard Detail 516.01. Provide four 1-inch diameter holes in the top at each compass point.

Weights shall not vary more than 5% +/- of the weight shown on Standard Detail 516 .01.

Acceptable Manufacturers and models are:

Manufacturer	Model
Capitol Foundry	MH-2001
US Foundry	USF-669
East Jordan Iron Works	V-1384

H. PIPE SADDLE SUPPORT - ADJUSTABLE

Adjustable Pipe Saddle Support: For Dry Conditions 2½-inch through 36-inch pipe: Material to be cast iron saddle formed to ductile iron pipe, with lock nut, and special cast iron reducer. Vertical adjustment range to be from 0 up to 4½ inches. Adjustable pipe saddle supports shall comply with Federal Specification WW-H-171E (Type 39). Pipe saddle supports shall equal or exceed the *Standon* Model S92, as manufactured by Material Resources, Inc., Hillsboro, OR., or Grinnell Figure 259.

Adjustable Pipe Saddle Support For Wet or Harsh Corrosive Conditions 2-inch Through 24-inch Pipe: Material to be steel saddle formed to ductile iron pipe, lock nut, and special steel reducer. Vertical adjustment range to be from 0 up to 4½ inches. Material to be 100% 304 stainless steel with saddles formed of ductile iron pipe. Saddle strap to meet ASTM A36. Collar and base cups ASTM A53 D.O.M. tubing. Thread Stud to meet ASTM A36, rolled thread, grade ASTM A307. Base Plate to meet ASTM A36 sheet steel, 0.25-inch. Pipe saddle support shall equal or exceed the *Standon* Model S92, as manufactured by Material Resources, Inc., Hillsboro, OR., or approved equal.

I. SERVICES

1) SMALL SERVICES: 3/4-INCH AND 1-INCH WATER SERVICES

Type K Copper, soft drawn; comply with ASTM B88. Services shall be ¾-inch to 1-inch and shall be one continuous run from main to meter with no joints or couplings in between. On these water services, the fittings shall be brass AWWA C800, or copper type fittings. See Standard Detail 515.01 and 515.02.

Service saddles shall be used on all service connections. Direct service taps are not permitted. See Standard Detail 512.06.

Service Saddles: Saddles shall be all bronze saddle with either a single or double bronze strap and a grade 60 neoprene "O" ring gasket attached to the body. The saddle casting, straps, and nuts shall be water works bronze 85-5-5-5. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. The saddle shall have CC flared corporation stop threads. See Standard Detail 515.01 and 515.02.

Acceptable service saddles are:

Manufacturer	Model
Ford	101B Series
Mueller	BR1B

Water Service 5/8 x 3/4-inch and 1-inch meter setter/yoke: ALL BRASS PRODUCTS SHALL BE LEAD FREE AND CONFORM TO NSF STANDARD 61-ANNEX G IN CONJUNCTION WITH NSF372 REQUIREMENTS. ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER. 5/8-inch x ¾-inch and 1-inch meter setters/yokes shall conform to AWWA C800 and be factory tested for water-tightness before shipping. Setters shall be comprised of all brass and copper padlock wing stop inlet ball valve (lockable cut-off), angle double check outlet valve, with inlet and outlet copper connections, and a 12-inch rise. See Standard Detail 515.01.

Acceptable meter setters/yokes are:

Size	Manufacturer	Model
5/8-inch x 3/4-inch	Ford	VBHH72-12W-11-33-NL
1-inch	Ford	VBHH74-12W-11-44-NL
Both 5/8-inch x 3/4-inch and 1-inch	Mueller	B-2404N-2A & two H-14222N couplings

Combined Domestic and Fire Protection SERVICE 3/4 x 3/4-inch and 1-inch meter setter/yoke: 3/4-inch x 3/4-inch and 1-inch meter setters/yokes shall conform to AWWA C800 and be factory tested for water-tightness before shipping. Setters shall be comprised of all brass and copper padlock wing stop inlet ball valve (lockable cut-off), angle double check outlet valve, with inlet and outlet copper connections, and a 12-inch rise. See Standard Detail 515.02. Acceptable meter setters/yokes are:

Size	Manufacturer	Model
3/4-inch x 3/4-inch	Ford	VBHH73-12W-11-33-NL
1-inch	Ford	VBHH74-12W-11-44-NL
Both 3/4-inch x 3/4-inch and 1-inch	Mueller	B-2404N-2A & two H-14222N couplings ^a

Notes:

^a Specify size of yoke when ordering Mueller setter

Meter Boxes: Meter boxes shall be 12-inch deep lightweight boxes with heavy duty polymer lid/cover capable of transmitting the AMI signal and marked with the OWASA logo. The box shall be ultraviolet light and chemical resistant as well as unaffected by freezing and moisture. Boxes shall equal or exceed Model 118-12 BCFXL by Oldcastle Enclosure Solutions, Madera, CA. Lids shall equal or exceed Model B12 by Nicor, Inc., Dripping Springs, TX. See Standard Detail 515.01 and 515.02.

2) 2-INCH WATER SERVICES

- a. **Service Pipe:** Type K Copper, hard drawn; comply with ASTM B88. Water service pipe for 2-inch connections shall be type "K" hard drawn copper with silver-brazed joints with brass fittings **or restrained joint Viega ProPress with EPDM gaskets or equivalent fitting pressure rated to 300 psi**. On these water services, the fittings shall be threaded type brass fittings. 1½" copper tubing is not permitted.

The service line for a 2-inch meter shall consist of a 2-inch tap, 2-inch type K hard drawn copper service line, a 2-inch Clow F6103, AFC series 2500SS, or Mueller H-2360-8 threaded Iron Body Gate Valve and a 2-inch x 4-inch long threaded (iron pipe thread) brass nipple. See Standard Detail 515.04.

- b. **Service Saddles:** Service saddles shall be 2-inch all bronze **or brass** saddle with double bronze straps and with a grade 60 neoprene "O" ring gasket attached to the body. All rubber gaskets and O-rings shall be manufactured

with an approved elastomer. The saddle casting, straps, and nuts shall be water works bronze 85-5-5-5. The saddle shall have 2-inch iron pipe threads.

Acceptable service saddles are:

Manufacturer	Model
Ford	202B Series
Mueller	BR2B

- c. **2-inch meter setter/yoke:** all brass products shall be lead free and conform to NSF Standard 61-Annex G in conjunction with NSF 372 requirements. All rubber gaskets and O-rings shall be manufactured with an approved elastomer. Meter Setters shall be constructed from 85-5-5-5 Brass (AWWA C800) and copper tubing, and factory tested for water-tightness before shipping. 2-inch meter setter/yoke shall be comprised of all brass and copper padlock wing inlet ball valve (lockable cut-off), angled double check outlet ball valve, 1 ¼-inch by-pass line with a 1 ¼-inch stop ball valve, in-line double check valve, and brace pipe eyelets for 1-inch pipe. Outlet connections are to be threaded. See Standard Detail 515.04. Acceptable meter setters/yokes are:

Size	Manufacturer	Model
2-inch	Ford	VBHH77-18BHC-11-77 (standard 18-inch rise) Ford Drawing No. B-95270-02
2-inch.	Mueller	Mueller Drawing No. B2423-2 (must specify 2-inch meter with 15-inch rise)

- d. **Meter Setter Idlers:** all brass products shall be lead free and conform to NSF STANDARD 61-ANNEX G in conjunction with NSF 372 requirements. Meter idlers shall be provided for the 2-inch setter. The idler is used to maintain proper spacing until a system is ready for a meter to be set. The meter idler for a 2-inch setter is manufactured by Ford and is designated as No. 7 Idler.
- e. **Small Meter Vaults:** Small meter vaults shall be constructed of precast concrete See Section 02510-2.3.E. The size and shape shall be as shown on Standard Detail 515.04. The cover shall have a minimum opening dimension of 30 inches x 36 inches. The access hatch shall be constructed with an aluminum tread plate cover, extruded aluminum frame with concealed hinges, hatch drain, and stainless steel hardware. The hatch shall have a slam lock and shall have an H-20 load rating. Vaults located within vehicular travel lanes shall meet the minimum AASHTO guideline H-20 traffic loads for full H20 loads. See specification Section 2.3.L, *Vault Access Hatch*, below.

Acceptable hatches are:

Manufacturer	Model
Bilco	J-3AL-H20
Halliday Products	H1R3036
US Foundry & Manufacturing Corporation	THS 30x36 W/OP

3) LARGE METER SERVICES (3-INCH AND LARGER):

- i. **Piping:** For services greater than 2 inches, the water service pipe shall be 4, 6, 8, 10, or 12 inches in diameter and shall be constructed of ductile iron pipe. 3-inch meters shall be served by a 4-inch tap and 4-inch service line. Ductile iron fittings shall be used on these services. 3-inch diameter pipe is not allowed in the OWASA distribution system. All taps will be made by using the appropriate size tapping sleeve and valve. On a dry line, the connection may be made with a tee and valve.
- ii. **Large Meter Vaults:** Meter vaults for 3-inch and larger meters shall be constructed of precast concrete with a floor drain with a connection that is compatible with 4-inch diameter ductile iron pipe. Meter vault floors shall be sloped toward the drain. Sump pumps are not permitted. Meter vaults shall have aluminum, cast-in-place double leaf, and spring-loaded doors with slam locks. Doors shall be rated H-20 in All areas. Vaults located within vehicular travel lanes shall meet the minimum AASHTO guideline H-20 traffic loads for full H20 loads. The vault doors shall be located over the water meter. See specification Section 2.3.L, *Vault Access Hatch*, below. Acceptable manufacturers for large meter vault access doors are Halliday Products, Inc., The Bilco Company, or an approved equal. Door sizes vary according to water main size. See Standard Details 515.13, 515.14, and 515.15.

Manufacturer	H-20 Model No.
Bilco	JD-2AL H20
Halliday Products	H2W4848
US Foundry & Manufacturing Corporation	Type THD 48x48 W/OP

Precast meter vault manufacturers are listed in Section 02510-2.3.E. See Section 02275 – *Trenching, Backfilling and Compaction of Utilities*, Section 3.3.B, paragraph 3 for bedding requirements for Structures.

Minimum meter vault dimensions shall be as follows below.

Meter Size	Minimum Vault Size
3- and 4-inch	10'-0" L x 8'-0" W x 6'-6" H
6- and 8-inch	12'-0" L x 10'-0" W x 6'-6" H

- iii. **Combinations Vaults:** Combination vaults shall be designed and constructed to provide the following minimum clearances between the pipe, fittings or vault walls:

Conflict	Minimum Clearance
Vault side wall to meter	24"
Vault side wall to side of pipe or valve	6"
Vault end wall to nearest bolted connection	6"
Pipe to pipe, fitting or valve	6"
Top of OS&Y valve stem (fully opened) to vault ceiling	6"

- 4) **Low Profile Vaults:** Some areas may require the use of a shallow vault. Detail 515.14 provides the minimum depth permitted.
- 5) **Meters:** All water meters are to be purchased from OWASA. Meters that are 2-inches and smaller shall be delivered and set by OWASA. For meters 3-inches and larger, Contractor shall pick up and install under supervision of OWASA. Appropriate lead-time for supplying meters shall be given to OWASA by the Contractor or Owner requesting the water meter. No meters will be installed until "Tentative Acceptance" of the lines has been granted and the appropriate fees paid.

Meters larger than 2-inches are to be provided with remote read out meter reading capabilities (see Standard Detail 515.13 for detail of remote readout in relation to vault).

J. TIE-RODS

Tie rods shall be 304 or 316 stainless steel, and of size and number as shown on Standard Detail 512.09. No duck lugs shall be allowed. All eyebolts shall be 304 or 316 stainless steel. All nuts and rod couplings shall be stainless steel, and be coated to prevent galling, or the use of stainless steel anti-seize compound used.

K. VALVE BOXES

Adjustable valve boxes shall be US made gray cast iron of the dimensions shown in Standard Detail 513.01 (*2-Piece Adjustable Screw Valve Box and Cover Detail*) of these specifications. Lids shall be heavy-duty traffic weight with the word "WATER" cast into the lid. Provide cast-iron telescoping top section of length required for depth of burial of valve and bottom section with base of size to fit over valve. Acceptable valve boxes are: Charlotte Pipe and Foundry Company Figure UTL 273 or Tyler Pipe Company 6850 Series or approved equal.

L. VAULT ACCESS HATCH

- 1) **All Areas** shall be Low Density Traffic H-20 Loading (incidental) – of 16,000 lb. wheel load on a 10-inch x 20-inch wheel area:

- 2) **Streets, Parking Decks, Etc.:** Vaults access Hatches located within vehicular travel lanes shall meet the minimum AASHTO guideline H-20 traffic loads for continuous vehicular traffic.
- 3) The aluminum access frames and covers are provided with a 1/4-inch thick structural grade aluminum channel frame with the flanges acting as a continuous concrete anchor. The inside of the frame has a continuous door support angle that must have a full bed of Class "A" concrete under both the frame and support angle. Door leaves shall be a minimum of 1/4-inch thick aluminum diamond plate with structural grade aluminum. Door reinforcing shall withstand an H-20 live load designation. The doors also have lifting aids of aluminum tubular construction with compression springs to assist in opening and closing of the doors. The doors are provided with heavy-duty stainless steel hinges with tamper-proof fasteners. All hardware is to be stainless steel. The doors open to 90 degrees and lock automatically in that position with a steel positive locking arm and a stainless steel release handle. Doors are provided with a stainless steel lifting handle, stainless steel snap-lock with removable key handle. Two key handles shall be provided with each door. The door leaves extend to the outside perimeter of the frame for added support.
- 4) **Guarantee and Manufacturer:** The aluminum access frames and covers shall carry a 10-year guarantee against defects in materials and workmanship. The frame and cover shall equal or exceed the units manufactured by Halliday Products, Inc. or The Bilco Company.

PART 3 – EXECUTION

INSTALLATION – PIPE AND FITTINGS

3.1 PIPE AND FITTINGS

Refer to Section 02275 – trenching, backfilling and compaction of utilities.

A. DUCTILE IRON PIPE

1) DIP Installation

- a. **Trenching & Bedding:** Refer to Section 02275 – *Trenching, Backfilling, and Compaction of Utilities*.
- b. **Installation of DIP Water Mains:** Comply with AWWA C600.
- c. **Pipe Laying - Separation:** The contractor shall comply with the NCDWR standards for separation of water mains from sanitary sewers or storm drainage lines. See Part 1 – GENERAL, Section 1.9, *Project Conditions* of this specification.
- d. **Materials, Storage, and Handling:** See Section 1.7, *Product Delivery, Storage and Handling*.

2) Construction

- a. **Construction:** Water mains and fittings shall be installed with approved tools in accordance with the requirements of ANSI/AWWA Standard Specification C600, which is herein made part of the specification by reference.

Construct piping to accurate lines and grades avoiding localized high points and support as required on drawings or described in specifications. When temporary supports are used, ensure that sufficient rigidity is provided to prevent shifting or distortion of pipe.

Pipe shall be laid with bell ends upgrade and facing the direction of laying.

Due care shall be taken in the storing and handling of pipes, fittings and valves to avoid contamination with the ground and prevent foreign matter from entering pipe and fittings. String out no more pipe than can be installed in a day. Gaskets shall be lubricated as per manufacturer's recommendations.

Pipe, fittings, and valves shall be carefully handled and lowered into the trench. Under no circumstances shall any pipe or fitting be dumped or rolled into the trench or be allowed to drop against the pipe or fitting already in the trench. Great care shall be taken to prevent the pipe lining and coating from being damaged, and the Contractor shall not install any damaged pipe. The Contractor shall be responsible for removal and disposal of damaged pipe.

Prior to being lowered in to the trench, all pipes shall be carefully inspected to see that each pipe is clean. If necessary, pipes shall be fitted together to ensure sufficient opening for the gasket or joint compound and smooth inside flow line.

Special care shall be taken to ensure that the pipe is well bedded on a solid foundation, and any defects due to settlement shall be made good by the Contractor at their own expense. Bell holes shall be dug sufficiently large to ensure the making of proper joints. Special precautions shall be exercised to prevent any pipe barrel or bell from resting on rock. A minimum of 6 inches is required between rock and the bottom of pipe (see Standard Detail 511.01 and Section 3.2.E, paragraph 2, *Cushioning Pipe in Rock*, of Section 02275 – *Trenching, Backfilling, and Compaction of Utilities*). If the bed formed in the bottom of the trench is too low, the pipe shall be removed, clean stone placed in the bottom, and a new bed prepared for the pipe. In no case shall the pipe be brought to grade by blocking under the barrel of the pipe. A uniform support shall be provided for the entire length of the pipe.

Whenever a pipe requires cutting, to fit in the line or to bring it to the required location, the work shall be done in a satisfactory manner with an approved cutting tool or tools which will leave a smooth end at right angles to the axis of the pipe, and not otherwise damage the pipe or liner. When the cut end is to be assembled in a *Fastite* bell, an adequately smooth (without sharp edges) bevel should be ground or filed on the cut edge to prevent damage to or dislodgement of the gasket during assembly. Generous bevels are

advantageous in the assembly of field prepared ends. The approved methods of cutting pipe are: rotary type, abrasive wheel, and snap cutter on DIP. No welding, flame cutting, or flame tapping will be allowed.

Mains shall be installed to the depth as directed by OWASA's Engineer, but in no case with a cover of less than 42 inches below finished grade. In the event site conditions prevent adherence to minimum cover requirements, approval of an alternate design by OWASA's Engineer is required. See Table 02275.1 of Section 02275 – *Trenching, Backfilling, and Compaction of Utilities*.

The Contractor shall be required at the end of the day's work to keep the end of the line, under construction, plugged to prevent foreign matter from entering pipe and fittings. A watertight plug shall be placed in the bell of the last joint of pipe laid. The pipe shall not be used as a means of draining ground water from the area.

Maximum horizontal deflections for ductile iron pipe shall meet AWWA C600, latest revision.

Allowable Joint Deflection			
Size (inches)	Nominal Laying Length (feet)	Maximum Allowable Deflection	
		Offset per Length (inches)	Deflection Angle (degrees/radius, ft)
4	18	19	5°/205
6	18	19	5°/205
8	18	19	5°/205
12	18	19	5°/205
16	18	11	3°/340
20	18	11	3°/340
24	18	11	3°/340
30	18	11	3°/340
36	18	11	3°/340
42	18	11	3°/340
48	20	12	3°/380

i. **Installing Mechanical Joint Pipe:**

- a) Gaskets shall not be exposed to oil, grease, ozone, extensive heat, sunlight, or other elements that would degrade the gasket. Store gasket in a cool dark place until installation in accordance with manufacturer's recommendations.
- b) Clean socket and plain end thoroughly, removing mud, oil, gravel, or any other foreign matter. Gaskets shall be lubricated. Paint the bell and the spigot with soap solution (half cup granulated soap dissolved in 1 gallon of water). Slip ductile iron gland on spigot end with the lip extension of the gland toward the end of the pipe. Paint rubber gasket with or dip into the soap solution and place on the spigot end with thick edge toward the gland.

- c) Push the spigot end forward to seat in the bell. Then, press the gasket into the bell so that it is located evenly around the joint. Move the gland into position, insert bolts, and screw nuts up finger tight. Then tighten all nuts to torque listed below (excerpted from AWWA C600):

Bolt Size (Inches)	Torque (Ft. – Lbs)
5/8	45-60
3/4	75-90
1	100-120
1 3/4	120-150

Tighten nuts on alternate side of the gland until pressure on the gland is equally distributed.

- d) **Permissible deflection** in mechanical joint pipe shall not be greater than listed in AWWA C600.

Allowable Joint Deflection			
Size (inches)	Nominal Laying Length (feet)	Maximum Allowable Deflection	
		Offset per Length (inches)	Deflection Angle (degrees/radius, ft)
4	18	31.0	8°-18'/125
6	18	27.0	7°-07'/145
8	18	20.0	5°-21'/195
12	18	20.0	5°-21'/195
16	18	13.5	3°-35'/285
20	18	11.0	3°-00'/340
24	18	9.0	2°-23'/450

- ii. **Installing Push on Pipe:** Standard PUSH-ON GASKETS ARE NOT PERMITTED FOR USE IN OWASA SERVICE AREA!

- a) Gaskets shall not be exposed to oil, grease, ozone, extensive heat, sunlight, or other elements that would degrade the gasket. Store gasket in a cool dark place until installation in accordance with manufacturer's recommendations.
- b) Clean the socket and 8 inches of the outside of the plain end thoroughly, removing mud, gravel, or any other matter that might cause the front of the gasket to protrude into the path of the entering spigot. Flex rubber gasket and apply lubricant supplied with the pipe to the plain end and to the inside surface of the gasket before assembly. Start the spigot end of the pipe in to the socket with care. The circumferential stripe on the plain end provides a visual indication for checking the proper insertion of the joint. Insert gasket fully in the gasket recess of the socket, large end of the gasket entering first. For assurance of proper gasket positioning, a thin automotive, blade-type feeler gauge can be used for quick and easy probing to confirm a properly installed gasket position around the joint. Then complete the

joint by forcing the plain end to the bottom of the socket with a forked tool or jack-type device.

- b. **Cutting Pavement/Driveways:** Where the water line is in an existing paved area, the edges of the pavement for the water line shall be cut in a straight line, parallel to the pipe on each side. Perform cutting operations prior to installation of water line to avoid excessive removal of asphalt. Care shall also be taken during installation of pipe to avoid damage to adjoining paved surfaces. Refer to the applicable Municipal or NCDOT standard pavement repair details pavement width and patching requirements. Driveway crossings shall be completed within 48 hours after the initial cutting of the pavement.
- c. **Protection of Pavement:** Whenever the water line is to be placed in or near a paved street, the Contractor shall provide pads or take necessary precautions to protect the pavement from damage by construction equipment. Pavement damage by cleats or tracked equipment, or by any other means, shall be repaired by the Contractor.

3) **Connections To Existing Mains**

The Contractor shall furnish all materials for connection to existing water mains. THIS INCLUDES ALL RODDING, BLOCKING AND BRACING NECESSARY TO PLACE WATER MAIN INTO SERVICE AS SOON AS TIE-IN IS COMPLETE. OWASA shall be the sole operator of all EXISTING valves and fire hydrants.

In making connections to the existing distribution system, valves shall be set as shown on the plans.

Before shutting off any main, residents are to be notified by an OWASA representative in writing 48 hours in advance of cut off. The Contractor shall provide assistance to OWASA in notification distribution.

If connection to an existing main requires a wet tap, such tap shall be performed by OWASA. Fees must be paid 48 hours in advance of tapping the main. Contractor is responsible for traffic control, excavating, dewatering, and safe access in the trench at the time of tap. The contractor is to provide tapping sleeve and valve. Contractor must have approved traffic control plan.

Work shall be scheduled at least one week in advance through OWASA's inspector. A crewman from the OWASA Distribution and Collection Systems Division shall be present during the operation. After installation of the tapping sleeve and valve and prior to performing the tap, the assembly shall be air tested at 100 psi. Such pressure shall be maintained with no loss for a minimum time of 5 minutes.

4) **Removal Of Asbestos Cement Pipe**

The Contractor is hereby advised that some of the pipe within the OWASA distribution system may contain asbestos. Removal, handling, and disposal of asbestos cement pipe shall be performed in accordance with applicable EPA and

OSHA regulations and applicable Federal, State and local regulations. Documentation and paperwork as well as a chain of custody are to be provided to OWASA.

5) Utility Protection

Take necessary precautions to protect existing utilities from damage due to any construction activity. The Contractor shall locate existing utilities, culverts, and structures (above or below ground), before any excavation starts and coordinate work with utility companies. Protect, maintain in service, and prevent damage to utilities not designated to be removed. Omission from or inclusion of located utility items on plans does not constitute non-existent or definite location. Secure and examine local utility surveyor records for available location data including building service lines. Contact underground damage protection services by contacting “National Call Before You Dig” at 811/NC One Call Center at 1-800-632-4949 48 hours before you dig.

The Contractor shall protect, maintain in service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on drawings or when locations differ from those shown on drawings, notify Project Engineer for instruction before proceeding. In the event that a gas line, water line, power cable or conduit, or telephone cable or conduit is broken or damaged, the Contractor shall give immediate notice to the proper authorities and shall be responsible for any damage to persons or property caused by such breaks. If a service pipe supplying water to an adjoining house is broken, the Contractor shall repair same at once. OWASA may, at the Contractor’s expense, repair any such service without prior notice to Contractor.

Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work.

The Contractor shall be responsible for protecting all existing utilities that could be damaged by excavation near the proposed line. Trench boxes may be necessary to prevent sloughing, etc., as well as to protect workmen, the motoring public, and the pavement. Failure to use a box, which subsequently results in damage to an existing line or other public improvements, shall be cause for liability against the Contractor for the repair costs.

6) Surface Or Ground Water In Trenches/Pipe:

When ground water is encountered, the Contractor shall pump, or otherwise remove any water that accumulates in the trenches and shall perform all work necessary to keep the trenches clear from water while pipe is being laid. No pipe shall be constructed in water and water shall not be allowed to drain through the pipe. At the end of the day, the open end of the pipe shall be kept closed by placing a watertight fitting plug into the bell end to prevent washing of any foreign matter into the line. All water removed from the trench shall be conveyed in a proper manner to a suitable point of discharge and shall comply with the applicable erosion and sedimentation laws. See also Section 3.1.G, *Dewatering of Section 02275 – Trenching, Backfilling, and Compaction of Utilities*.

7) Abandoning Of An Existing Water Mains/Services/Lines:

Services: When abandoning services 2-inch in diameter, the valve shall be closed and the pipe cut and removed from the valve, a threaded plug shall be installed into the valve body. On lines smaller than 2" in diameter, the corporation stop shall be turned to the off position, a flair cap placed on the corporation stop and the line shall be cut as close to the main as possible and a one-foot segment of the line removed. **A galvanized saddle shall be removed and replaced with a repair clamp or brass saddle with brass plugs, as directed by OWASA. For larger services, the service shall be removed and straight-piped, capped, or a blow off added, as directed by OWASA. Leaded tees/ connections shall be replaced and straight piped.**

Mains: When an existing water main is replaced with a new water main, abandonment of the existing line is required once it is no longer in service. The line shall be abandoned as shown in Standard Detail 512.05 or as directed in the plans and Specifications. Additionally, the following water pipes shall be abandoned by removal or by filling with grout / flowable fill concrete (50 psi minimum/ 150 psi maximum) in accordance with the following criteria:

- a. Pipes larger than 24-inches diameter
- b. Pipes located within roadway section and meeting one of the following conditions:
 - i. pipes that are 12-inches diameter up to and including pipes that are 24-inches diameter and are buried less than 20 feet below finished grade
 - ii. pipes that are 6-inches diameter up to 12-inches diameter that are not cast iron, ductile iron, PVC, or HDPE and are buried less than 12 feet below finished grade
- c. Pipes located below groundwater table that could become a conduit for water movement:

Optionally, pipe may be excavated and removed subject to Engineer's approval and approval of controlling agency of Right-of-Way. Additionally, if a valve is not located at the source, plugging of the branch at the source will be required. Location of abandonment shall be approved by an OWASA representative.

B. STEEL ENCASEMENT PIPE – DRY BORING & JACKING OR OPEN CUT

- 1) **General:** Where required, steel encasement pipe shall meet the length as shown on the plans and the thickness and diameter as shown on Standard Detail 517.01. Boring across roads and railways shall be performed by dry boring and jacking a steel encasement pipe under the pavement or rail. The encasement shall be located in an area that is relatively free from material such as rock and stone that may hamper the boring operation.

Construction shall be executed in such a manner as to prevent settlement of the ground surface above the pipeline. The installation of the pipeline shall follow the heading or tunneling excavation as closely as possible.

All operations of the Contractor shall be subordinate to the free and unobstructed use of the right of way of the passage of traffic without delay or danger to life, equipment, or property. Installation shall be in accordance with of the NCDOT *Standard Specifications for Roads and Bridges*, latest revision or *AREMA Manual for Railway Engineering*, as applicable.

The pipe shall be beveled and prepared for field welding at the circumferential joints. Joining of steel casing pipe shall meet the requirements of AWWA C206. Casing shall be installed either by dry boring and jacking or open cut, as indicated on the drawings.

Encasement ends shall be enclosed as shown on Standard Detail 517.01. All exposed metal is to be coated with epoxy, asphaltic material or be stainless steel.

All carrier piping shall be ductile iron pipe supported by spiders.

- 2) **Manufactured Spiders:** The spiders necessary to support the carrier pipe inside of the steel encasement pipe shall conform to both the shape and dimensions of Standard Detail 517.01 and shall be in accordance with Section 2.1.D, paragraph 2, *Spiders/Skids for Encasement Pipes*. Unless otherwise shown on the drawings, one spider shall be placed at each bell as well as at each end of the encasement pipe (see Standard Detail 517.01 for location of spiders).

C. TUNNELING METHODS

1) General

- a. The Contractor shall submit shop drawings to OWASA's Engineer for approval prior to construction. All liner plates and ribs used in the tunnel shall be of one type. All material removed shall be disposed of off the site by the Contractor.
- b. All operations of the Contractor shall be subordinate to the free and unobstructed use of the rights of way for passage of traffic without delay or danger to life, equipment, or property. The Contractor shall provide all necessary bracing, bulkheads, and shields to ensure complete safety to all traffic at all times. The Contractor shall provide all traffic control devices as necessary and as shown on the approved traffic control plan at no additional cost.

2) Tunneling (Boring Method)

- a. Commence boring operation from a pit, with the bottom excavated to grade, and sheeted or shored if necessary. Boring through soil shall have a steel pipe jacked in place as a casing pipe. Boring through rock shall be oversized

to allow installation of carrier pipe but no casing pipe shall be required unless liner plate is necessary for safety reasons.

- b. Smoothly pave the bottom of the tunnel with concrete. Pull the carrier pipe in place a joint at a time. Securely block each section in place.

3) Tunneling (Hand Mining)

- a. Commence tunneling operation from a pit, with the bottom excavated to plan grade, and sheeted or shored if necessary.
- b. Trim the periphery of the tunnel smoothly to fit the outside of the steel liner plate as nearly as practical. All blasting shall conform to requirements for blasting in Section 02275 – Trenching, Backfilling and Compaction of Utilities.
- c. Install the steel liner plates immediately after the excavated material has been removed and remove the material not more than 24 inches ahead of the installed liner plates.
- d. Grout all voids between the soil and tunnel liner plates. The maximum grouting pressure shall be 30 psi. Start grouting at the bottom of the tunnel liner plates and proceed upward progressively and simultaneously on both sides of the tunnel. Install liner plates no more than 6 feet ahead of grout section. Prohibit traffic over ungrouted sections of tunnel unless this section is in solid rock. Thoroughly dry-mix grout ingredients before adding water. After adding water, mix the batch for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. Placing shall be quick and continuous. Placement shall be under pressure with a grout pump. The period between installation of the tunnel liner plate and the placing of grout shall not exceed 7 hours, without the approval of OWASA's Engineer. Upon completion of grouting, fill grout plugs with provided grout hole plugs.
- e. Smoothly pave the bottom of the tunnel with concrete: After installation of the tunnel liner plates, the Contractor shall pour concrete pavement on the bottom quadrant (invert) of the tunnel, the surface of the pavement being parallel to the liner plate, with screed rails embedded in it, on line and grade for the installation of pipe in the tunnel.
- f. The periphery of the tunnel shall be trimmed smooth to fit the outside of the steel liner plate as nearly as is practical, so that the void outside the plates is a minimum.
- g. After installation of the casing pipe or the tunnel liner, pull the carrier pipe in place a joint at a time. Securely block each section in place. Each joint of the carrier pipe shall be supported at two points by steel saddles or by pressure treated wood skids, strapped to the carrier pipe with steel straps. The carrier pipe shall be blocked, in place to the prevent flotation.
- h. Close tunnel liner ends to protect against entrance or foreign matter. The open ends of the casing pipe or tunnel shall be closed off by an 8-inch grout

or masonry block wall prior to backfilling. A steel drain line to a 1 cubic yard French drain shall be provided.

- i. If installation is under railway tracks, all permits shall be obtained and Railway Company shall be notified prior to such installation. The same shall apply to contacting applicable Municipality or NCDOT if installation is under roadway.
- 4) See also PART 2 – PRODUCTS, Section 2.1.E, *Tunnel Liners and Appurtenances*.

D. HORIZONTAL DIRECTIONAL DRILLING OF HDPE WATER PIPE

- 1) HDPE pipe shall be installed by Horizontal Directional Drilling (HDD) using a surface mounted rig, first to drill a guided hole along a bore path consisting of a shallow arc and then to pull a string of pipe into the hole. Pull back is facilitated by a back-reamer, which enlarges the hole to approximately one and a half times the pipe diameter. Drilling fluids are injected into the bore hole to stabilize the hole and lubricate the pipe and drill-string. Tracking equipment is used to guide and direct the drilling.

- a. **Mechanical Restraint:** When Polyethylene pipe is pressurized, it expands slightly and shortens slightly. Shortening may be enough to disjoin unrestrained mechanical joints that are in line with PE pipe. Disjoining can be prevented by installing external joint restraints at mechanical connections, by installing line anchors, or by a combination of both. Contractor shall install mechanical connections with joint restraint at connection to mechanical joint pipe.

Note: Poisson Effect pipe shortening must be taken into account whenever the pipe is pressurized, both during the pressure testing, and when it is placed in service. Because pressures are usually higher during pressure testing (up to 150% of the system pressure rating), pipe expansion and Poisson Effect pipe shortening may be slightly greater during pressure testing. Before pressure testing, all mechanical joint restraints must be completely installed and secured per manufacturer's instructions. Concrete in-line anchors and thrust blocking (if used) must be fully cured (minimum of 21 days for 3,000 psi or 7 days for 4,500 psi concrete) and properly backfilled before testing. Restraint is not required at PE to PE butt fusion joints. Restraint is not required at bolted flanged joints.

- b. **Mechanical coupling:** Stainless steel internal stiffeners shall be used on all couplings to increase the seal. All couplings shall have restraint devices per the manufacturer's recommendation and installed per the Manufacturer's direction.

2) Installation And Testing

The Manufacturer shall supply an Installation Manual to OWASA's Engineer, which outlines guidelines for handling, joining, installing, embedding, and testing

of the Polyethylene Pipeline. These guidelines shall be used as reference material by OWASA's Engineer in their determination of the required procedures.

Joints between plain ends of Polyethylene pipe shall be made by butt fusion when possible. The pipe manufacturer's fusion procedures shall be followed at all times as well as the recommendations of the fusion machine manufacturer. The wall thicknesses of the adjoining pipes and fittings shall have the same DR at the point of fusion.

When saddle connections are fusion welded, the Manufacturer's recommended saddle fusion procedures shall be used.

If mechanical fittings (which are designed for, or tested and found acceptable for use with Polyethylene pipe) are utilized for transitions between pipe materials, repairs, joining pipe sections, saddle connections, or at other locations; the recommendation of the Mechanical Fitting manufacturer must be followed. These procedures may differ from other pipe materials.

On each day butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, and then fusion test straps shall be cut out. The test strap shall be 12 inches long or 30 times the wall thickness in length (minimum) and 1 inch or 1.5 times the wall thickness in width (minimum). Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely, and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.

Socket and Straddle fusions shall be tested by a bent strap test as described by the Pipe manufacturer. The pipe manufacturer shall provide visual guidelines for inspecting the butt, saddle, and socket fusion joints.

Pressure testing shall be conducted in accordance with manufacturer's recommended procedure. Pressure testing shall use water as the test media. Pneumatic testing is prohibited.

3) Shop Drawings

Contractor shall submit shop drawings and details on the proposed HDPE pipe, fittings, bore methods, etc., for review and approval of OWASA's Engineer before ordering material or beginning installation of the HDPE. Contractor shall also submit to OWASA's Engineer proposed subcontractor's name as well as references on who they plan to use on this project. All subcontractors/installers must be approved by OWASA's Engineer.

E. PVC PIPE

- 1) PVC pipe shall only be used with written approval from OWASA's Engineer.
- 2) If PVC pipe must pass through an area contaminated with or subject to contamination with low-molecular-weight organic solvents or petroleum products, the design engineer shall provide a determination regarding the suitability of PVC

pipe for the installation, including documentation from the manufacturer regarding permeation.

- 3) Pipe bundles shall be stored on flat surfaces with uniform support, be protected from prolonged exposure (six months or more for all pipe) to sunlight with a suitable covering (canvas or other opaque material), and air circulation shall be provided under any covering.

3.2 VALVES AND FIRE HYDRANTS

A. VALVE APPLICATIONS

1) Valves – Vault/Above Ground Applications

a. Plumbing Gate Valves:	Brass non-rising stem type (for air release valve manholes)
b. Gate Valves 2-inch & smaller:	Bronze ¼ turn ball type
c. Gate valves 4-inch & larger:	OS & Y
d. Relief Valves:	Air/Vacuum Release Valves
e. Water-Regulating Valves:	Pressure-regulating valves Flow-regulating valves
f. Detection of unauthorized water:	Detector Check Valves
g. Backflow prevention:	Reduced Pressure Zone Backflow Preventers – USC approved

- 2) **Valves – below ground applications:** Non-rising stem.

B. GATE VALVES

- 1) **Setting of valves and valve boxes:** Valves shall be installed with stems in a vertical plane through the pipe axis and perpendicular to the pipe axis. The Contractor shall clean the valves before installation and check for satisfactory operation. All valves adjacent to tees or bends shall be tied to the fitting with a restraint flange joint restraint system OR APPROVED RESTRAINT METHOD. Valve nut extensions shall not be installed unless approved by OWASA's Engineer.

Nipples for 4-inch through 12-inch valves shall be cut so that the valves are installed 30 inches from the fitting (centerline to centerline). 2-inch valves shall be installed with a 4-inch long brass nipple.

- 2) All underground valves without gearing or operators shall be equipped with a 2-piece valve box with lid (see Standard Detail 513.01). Valve boxes shall be set on concrete brick placed beneath the bottom outstanding flange of the valve box. Place a minimum of 1 inch of earth cushion beneath the concrete brick and the

valve and the valve box set in alignment with the valve stem centered on the valve nut, set in a manner to prevent transmitting shock or stress to the valve. Place #57 stone around pipe and under valve box. Valve box cover must be set flush with the finished ground surface or pavement. The Contractor shall be responsible for keeping valve boxes clean and free of any foreign matter until acceptance of the project.

- 3) Valve boxes shall be set to grade and a concrete stabilizing pad placed around the valve box. Valve boxes in easements are to be provided with a valve box marker post. See Standard Detail 513.02.
- 4) When valve box tops project more than 1 inch above the unfinished road surface, a temporary layer of asphaltic concrete feathering shall be required to provide a smooth transition from 1 inch below the edge of the rim and cover to the unfinished road surface. The exposed sides of the valve box shall be painted bright orange. See Standard Detail 532.07.
- 5) Valves at intersections shall be restrained with restraint flange system.

C. VALVES 16 INCHES AND LARGER (GATE OR BUTTERFLY VALVES)

Valves at standard depths (See Table 02275.1) shall be installed with a valve box. Valves with gearing or operators or those installed at excessive depths as determined by OWASA shall be installed in a manhole. The manhole or valve box shall be constructed/set in such a way as to prevent transmitting any load or shock to the valve. It is also to be set in such a way that the packing, operator, and other parts of valve are readily accessible for minor repairs. The valve is to be provided with a flanged coupling adapter to permit valve removal for maintenance. Manholes shall be constructed in accordance with the Standard Details 513.06 and 513.08. Manhole or valve box opening shall be positioned over the operating nut. Either a gate valve or a butterfly valve may be used.

D. TAPPING SLEEVES AND VALVES

Tapping sleeves and valves shall be installed in accordance with the manufacturer's recommendations at locations shown on the plans. With prior approval, when taps are made on asbestos cement pipe, the Contractor shall excavate at the location of the tap and measure the diameter of the pipe prior to selecting a tapping sleeve to ensure the sleeve will fit the pipe (this information shall be provided to OWASA on the as-built drawings). See Standard Detail 512.04. Taps shall be performed by OWASA. Fees must be paid 48 hours in advance of tapping the main. Contractor is responsible for traffic control, excavating, dewatering, and safe access in the trench at the time of tap. The contractor is to provide tapping sleeve and valve. Contractor must have approved traffic control plan.

Work shall be scheduled at least one week in advance through OWASA's inspector. A crewman from the OWASA Distribution and Collections Division shall be present during the operation. After installation of the tapping sleeve and valve and prior to performing the tap, the assembly shall be air tested at 100 psi. Such pressure shall be maintained with no loss for a minimum time of 5 minutes.

E. AIR RELEASE VALVES

Air release valves are to be used to bleed air during filling of a water line and to automatically vent air that collects in the water lines. Pressure air release valves shall be located as shown on the drawings. The valve shall be housed in a precast concrete eccentric manhole and shall be installed in accordance with Standard Details 513.04 and 513.05. All pipe and fittings are to be brass including the plumbing gate valve. Air release valve locations shall be as shown on the plans and or as otherwise directed by OWASA's Engineer.

F. FIRE HYDRANTS

- 1) **Construction:** Fire hydrants shall be installed where shown upon the plans UNLESS the Fire Marshall of the governing municipal REPRESENTATIVE HAVING jurisdiction CHANGES THE LOCATION. Hydrants shall be set upon a concrete setting slab in such manner as to preclude the possibility of settlement of hydrants. Place loose #57 stone around the hydrant elbow. See Standard Detail 514.03.

Hydrants are to be located at a distance from the curb or edge of pavement to provide ready access and minimize the possibility of damage from vehicle and set to the height prescribed by Standard Detail 514.03 with the pumper nozzle facing or pointing to the street or fire access lane. Care shall be taken to keep concrete away from bolts and weep holes. Hydrants must be set with the stem vertical/plumb and the flange above grade. The Contractor is responsible for determining barrel length and ordering to meet conditions. Where adjustments in height are needed, provide extension kits at no additional cost. However, only one 24-inch riser extension is allowed per hydrant. Where hydrants are set behind guardrails, the pumper nozzle shall be set with its centerline a minimum of 12 inches and a maximum of 18 inches above the top of the guardrail.

An OWASA representative must inspect fire hydrants prior to backfilling.

- 2) **Operation and Painting:** Hydrants, upon installation and prior to acceptance of the project, shall be painted and greased, the caps are to be greased with a food grade anti-seize lubricant after installation, and individually operated in front of an OWASA representative to verify the hydrant is greased and in working condition. Paint is to be Sherwin Williams Industrial Enamel or equal. The hydrant barrel is to be painted red with the caps and bonnet painted reflective silver. See Standard Detail 514.01. Do not remove chains.

3) Hydrant Bagging

- a. **New Hydrants:** Place a heavy-duty orange plastic bag over newly installed fire hydrant until hydrant is placed in service and accepted by OWASA.
- b. **Out of Service Hydrants:** During times when a fire hydrant is taken out of service, such as when it has been replaced with a new hydrant, or when it is abandoned, place a heavy-duty orange bag on hydrant.

- 4) **Valving of Main:** A resilient seat gate valve shall be installed 30 inches from the fitting of the main and properly restrained. Provide a concrete stabilizing pad in accordance with Standard Detail 513.02.
- 5) Fire hydrants are to be pressure tested with the main.

G. BACKFLOW PREVENTERS

See OWASA Cross-Connection Control Ordinance and Manual, latest revision as applicable.

3.3 MISCELLANEOUS APPURTENANCES

A. SERVICES

- 1) **General:** Taps into existing (in-service) water mains shall be made by OWASA personnel only. All fees must be paid and work scheduled with OWASA Operations Department before OWASA will make the tap. All materials must be on-site, trenches open, and shoring and traffic control devices in-place before OWASA will perform the tap. Contractor may be required to provide approved traffic control plan if required by inspector.

a. Allowable Tapping Methods

- i. $\frac{3}{4}$ or 1-inch taps are to be made using an all bronze single or double strap tapping saddle. See Standard Detail 512.06.
- ii. $1\frac{1}{2}$ -inch and 3-inch taps are not permitted.
- iii. 2-inch taps shall be made using a 2-inch all bronze double strap tapping saddle.
- iv. Taps 4-inches and larger are to be made using an iron body tapping sleeve. Steel sleeves are not permitted.

Service Connections on "In-Service" water mains.	
Size Connection	Responsibility
$\frac{3}{4}$ -inch and 1-inch services	OWASA makes tap and runs service
2-inch and larger services	Contractor digs hole at main, runs line, and furnishes all material. OWASA makes tap.

- b. **Tap Location:** Taps 2-inches and smaller shall be made no closer than 18 inches apart **from the next tap, and a minimum of 3 feet from a bell, repair clamp, or fitting** (see Standard Detail 512.06). Taps shall be made in line with the meter box. Copper service lines shall be installed in a straight line from the tap to the box. Services shall be perpendicular to the main.
- c. **Three-Quarter ($\frac{3}{4}$) and 1-inch Taps:** All $\frac{3}{4}$ -inch and 1-inch taps into water mains shall be made using an all bronze tapping saddle. Corporation stops shall have AWWA Standard CC tapered threads. Taps shall be made at a 45° angle above the horizontal on the upper half of the pipe. A bend or

"gooseneck" in the service line shall be provided to ensure flexibility. A double strap saddle shall be used on both PVC and AC pipe. Multiple taps in the same section of the pipe shall be staggered (see Standard Detail 512.06). Two $\frac{3}{4}$ -inch services in the same location may be served by a single 1-inch tap (see Standard Detail 515.01 and 515.02). On these water services, the fittings shall be flared type brass. (ALL BRASS PRODUCTS SHALL BE LEAD FREE AND CONFORM TO NSF STANDARD 61-ANNEX G IN CONJUNCTION WITH NSF372 REQUIREMENTS. (Saddles are exempt from the no lead requirement.) ALL RUBBER GASKETS AND O-RINGS SHALL BE MANUFACTURED WITH AN APPROVED ELASTOMER.) Corporation stops shall be placed in clean #57. Stone is to be carried under and around the pipe to protect the corporation stop. Service saddles are also to be embedded in 1 cubic foot of #57 stone.

- d. **2-inch Taps:** All 2-inch taps shall be made using a 2-inch all bronze double strap saddle, a 2-inch diameter x 4-inch long brass threaded nipple, and a 2-inch threaded Iron body gate valve. Water service pipe for 2-inch connections shall be type K hard drawn copper pipe with silver brazed joints. For short distances between the main and the meter, threaded brass pipe may be used. See Standard Detail 515.04 and Section 2.3.J.
 - e. **Large Taps:** Taps 4-inch and larger shall be made using iron body tapping sleeves and tapping valves. Only one 4-inch or larger tap **or repair clamp** shall be made per joint of pipe on AC and/or pit cast (gray iron) pipe. The outside diameter of the pipe must be measured at the location of the tap to determine the appropriately sized tapping saddle.
 - f. An **OWASA representative** must inspect all service connections prior to backfilling.
 - g. **Tapping Sleeve Support:** AC Pipe: A concrete pad shall be poured under tapping sleeves placed on AC pipe to support the weight of the tapping sleeve and valve. Wrap sleeve with plastic to protect bolts and nuts. Care shall be taken to ensure that bolts and nuts are free of concrete and debris to allow accessibility for future repairs. An OWASA representative must inspect all blocking prior to backfilling.
- 2) **Small Meter Boxes and Setters:** Installation: Meter boxes for $\frac{3}{4}$ -inch x $\frac{5}{8}$ -inch and 1-inch meters shall be installed within the utility strip behind the curb, or within the right of way at the back of the sidewalk. Meter boxes shall be set on four 4-inch x 8-inch concrete bricks, one on each corner. All meter boxes shall be set so that there is a minimum of 8-inch clearance between the top of the box and the cut-off nut on the meter setter. The meter setter shall be straight, level and centered in the box. Meter boxes shall be set to avoid inflow of surface water into the box. See Standard Detail 515.01 and 515.02.
- 3) **Three-quarter ($\frac{3}{4}$)-inch and 1-inch Copper Service Lines:** Copper service lines shall have a minimum of 30 inches of cover from the water line to the top of the back of curb or centerline of the drainage ditch. Service lines shall run perpendicular from the water main to the property served. Water service pipe

shall be one continuous run, from main to meter setter, of type K soft copper with no joints or couplings in between.

- 4) **2-inch Meters:** Meter boxes for 2-inch meters shall be placed on a 6-inch bed of clean #57 stone. Meter boxes shall be set so that there is a minimum 12 inches of clearance between the top of the box and the cut-off nut on the meter setter. The meter setter shall be straight, level, and centered in the box. Meter boxes shall be set to avoid inflow of surface water. Drains for 2-inch meter vaults shall be installed if grade allows.

Meter setters 2-inch meters shall be provided with a section of copper pipe extending horizontally 24 inches out the back of the meter box. The outlet connection on 2-inch meter setters shall be plugged with a pipe plug until pressure testing has been completed on the section of main to which it is connected. Setters are to be perpendicular to meter and vertical. For 2-inch setter, use a 17-inch long idler bar with two 1/8 rubber gaskets. The idler is used to maintain proper spacing until a system is ready for a meter to be set. The setter should have an opening of 17 ¼ inch.

- 5) **Meter Vaults:** Meter vaults for 3-inch and larger meters shall be placed level on a 6-inch bed of #57 stone that has been thoroughly and firmly consolidated. The vault floor shall have a floor drain with the floor sloped toward the floor drain. A minimum 4-inch diameter drain on negative grade to daylight shall be provided. Sump pumps are not permitted. Meters and fittings shall be supported by mortared concrete masonry units. Vault doors shall be centered over the meter and otherwise located as shown. See meter vault Standard Details 515.13, 515.14, and 515.15.
- 6) **Grounding to Water Services:** Grounding shall not be allowed to be connected to meter boxes or vaults. As a minimum, place meter boxes/vaults no closer than 10 feet from a building. If unavoidable, place a grounding jumper around meter box/vault.
- 7) **Abandoning Water Services:** Water services shall be abandoned by closing the corporation stop at the main and cutting out a section of the water service, 1 foot from the corporation stop. **A galvanized saddle shall be removed and replaced with a repair clamp or brass saddle with brass plug, as directed by OWASA.**
- 8) **Testing:** All taps and services shall be pressure tested with the main.

B. RESTRAINTS/CONCRETE THRUST BLOCKING

- 1) **Thrust Blocking:** Thrust Blocking SHALL be installed at the direction of the OWASA Representative or as shown on the plans. Thrust blocks shall be constructed from 3000 psi concrete (at 28 days) and poured against an undisturbed earth trench wall. Concrete thrust blocking shall be constructed in accordance with Standard Detail 512.02. Sacrete is not permitted. Concrete anchors may be unformed but minimum dimensions must be maintained. All fittings and pipe shall be wrapped in plastic prior to installation of concrete to ensure that bolts and nuts are free of concrete and debris to allow accessibility for future repairs. When soft, mucky, unsuitable, or unstable soils are

encountered, thrust shall be resisted by running tie rods to solid foundations by removing the soft materials and replacing it with ballast of sufficient size and weight to resist thrust.

Vertical upward thrust at fittings or vertically deflected joints shall be resisted with thrust collars of adequate size and weight to resist thrust. See Standard Detail 512.01.

Pipe manufacturer's installation manuals shall be followed for the anchoring of valves and fittings in difficult locations unless superseded by the requirements of these specifications.

Concrete thrust blocking is not recommended where the blocking may bear on other utilities or where the area behind the block may be excavated in the future.

An OWASA representative must inspect all blocking and anchoring prior to backfilling.

- 2) **Rodding:** 4-inch and larger valves and assemblies of fittings shall be secured to a blocked fitting by threaded rods with eyebolts. Refer to Standard Detail 512.09 for the minimum size and number of rods needed for various test pressures. No more than one coupling shall be allowed between rods. Rodding length between fittings shall not exceed 20 feet. When the length between fittings exceeds 20 feet, place a thrust collar on the line and rod to the thrust collar.

All eyebolts, nuts and threaded steel rods shall be 304 or 316 stainless steel.

- 3) **Thrust Collars:** Thrust collars shall be constructed as shown in Standard Detail 512.08 for pipes up through and including 36 inches in diameter. The thrust collar shall consist of a wedge action restrainer gland (see Section 2.1.A, paragraph 2, item c., *Mechanical Joint Restraints*, of this specification for manufacturer and model number of approved restrainer gland) placed around a joint of ductile iron pipe encased in a reinforced 3000 psi concrete block. Where the blocking provides thrust resistance for fittings, threaded rods shall be connected to the restraint flange fitting secured to a full joint of ductile iron pipe. On dead end lines, the thrust collars must be placed on a full joint of ductile iron pipe just after the terminal end line valve.

C. MANHOLE INSTALLATIONS

Manhole bases shall be placed on a level 12-inch bed of #57 stone that has been thoroughly and firmly consolidated. Voids around the pipe, joints, grade rings, and other openings in the manhole shall be thoroughly and neatly grouted inside and outside with a non-shrink gout to prevent infiltration. A maximum of 2 grade rings or one grade ring and one course of concrete bricks will be allowed to bring the rim and cover to finished grade (see Standard Detail 532.06). If additional height is required, a riser must be installed.

Manhole rings and covers shall be installed a minimum of 12 inches above grade in easements and cemented to the cone section. In paved areas, an 8-inch thick by 18-inch wide annular concrete pad is to be placed around the manhole iron casting (see

Standard Detail 532.06) beginning 2 inches from the top of the manhole ring. In other areas, the ring is to be placed beginning ½ inch below the top of the ring. For air release manholes, flat tops shall be used. **When a manhole rim projects more than 1 inch above the unfinished road surface, a temporary layer of asphaltic concrete feathering shall be required to provide a smooth transition from 1 inch below the edge of the rim and cover to the unfinished road surface. The exposed sides of the manhole shall be painted bright orange. See Standard Detail 532.07. To protect a manhole, the contractor shall set the concrete pad to final grade and feather asphalt from the concrete pad to the existing grade for a smooth surface prior to OWASA accepting the manhole for operation.**

3.4 TESTING, DISINFECTION AND SAMPLING

A. GENERAL

Pipelines shall be hydrostatically pressure tested, in sections between valves, as soon as the installation is completed. Disinfection shall occur after hydrostatic test has passed, then sampling may begin. Testing, disinfection, and sampling shall be as follows:

- 1) Pipelines and appurtenances have been laid and the trench backfilled. Pipe subjected to contaminating materials (any type) shall be removed from the project site immediately. OWASA shall bear no portion of any cost sustained by the Contractor in meeting the specification.
- 2) Hydrants shall be properly located, operable and plumb, and at correct elevation.
- 3) Valves shall be properly located, operable, and at correct elevation. Valve boxes or manholes shall be centered over operating nuts and the top of the box or manhole shall be at proper elevation.
- 4) All services shall be installed complete with setters (Contractor shall provide a meter, approved by OWASA, for pressure testing). There shall be no bypass around the meter used for pressure testing.
- 5) All reaction anchors (if any) have had sufficient set of 7 days or high early strength concrete may be used to reduce the curing time to 3 days. For high early concrete mix, use 4,500 psi or greater concrete. Temporary bracing may be allowed at the discretion of the OWASA Representative.
- 6) Lines shall be properly vented where entrapped air is a consideration.
- 7) All visible leaks, broken or cracked pipe, valves, hydrants, etc. shall be repaired.
- 8) Air release valves shall be installed complete and in place after pressure test.
- 9) All construction activities on the project, that requires trenching or excavation within the limits of the water location shall be completed. Pavement base course and curb and gutter shall be in place before sampling, if applicable. Pressure testing is to be performed before pavement is put down.

10) **Pigging.** All new mains which cannot meet 3.0 fps flushing velocity as calculated by the Engineer of Record shall be pigged with a polyethylene "pig", 5# per cubic foot density, at minimum, that is the size as specified by the manufacturer for the interior diameter of the main, upon the conclusion of installation. The contractor installing the line shall write the name of the company and street name in which the work is taking place on the pig in a way it will not rub off.

11) Line shall be disinfected and samples collected.

12) Approval from OWASA's Representative on section of line to be sampled.

B. ORDER OF OPERATIONS

- 1) **Fill Line:** Fill the system slowly with water, at a velocity of approximately 1 foot per second, while necessary measures are taken to eliminate all air at the highest points of the system where air may collect in pockets. After filling, shut off system in order to prevent contaminated water from flowing back in the line supplying the water.
- 2) **Flushing:** Allow filled system to set undisturbed for a minimum of 24 hours, then begin flushing operations. Flushing shall be a velocity of not less than 3.0 feet per second to remove sediment and other foreign matter until the water runs clear. For lines larger than 12 inches, follow AWWA guidelines. The Contractor shall be responsible for making adequate provisions for drainage of large volume of flushing water, including proper de-chlorination/disposal of chlorinated water. All water shall be chemically de-chlorinated. Any damages that may occur from this operation shall be the sole responsibility of the Contractor.
- 3) **Pressure Test:** A pressure test shall be scheduled with an OWASA representative in advance of chlorination of the main. Testing shall be in accordance with Section 3.4.C, *Pressure Tests & Leakage*.
- 4) **Chlorination of Line:** Chlorination of the line shall be performed by one of the methods described in Section 3.4.D.1. An OWASA representative will perform a high range chlorine concentration test. Chlorine concentration of 100 mg/l minimum must be provided. Allow chlorinated water to set in the test section for 48 hours. The chlorine concentration shall not drop below 20 ppm within a minimum period of 48 hours. See Section 3.4.D, *Disinfection and Bacteriological Testing*.
- 5) **Sampling – Day 1:** Check chlorine and turbidity. Once the control valve has been opened a continuous flow of water shall be maintained until all samples have been collected. After allowing the system to flush so that at least two volumes of water pass through the main, the first bacteria sample shall be collected at regular intervals not exceeding 1,200 feet and tested for bacteriological quality. The contractor shall be responsible for making adequate provisions for drainage of large volume of flushing water, including proper de-chlorination/disposal of heavily chlorinated water. See Section 3.4.D, *Disinfection and Bacteriological Testing*.

Note: Services shall be included in the main line disinfection process. The Contractor shall have the same responsibility for laterals as for the mains in regard to bearing full cost of any corrective measures needed to comply with either the bacteriological test or other such requirements.

- 6) **Sampling – Day 2:** The water main shall not be flushed for more than 5 minutes before the first sample is collected. OWASA's Representative will check both chlorine concentration and turbidity. If within the acceptable limits, a second bacteriological test will be performed collecting from the same discharge points as on day one. If the second bacteria sample has passed, the system may be left in service if NCDWR PWS Section final approval has been granted.
- 7) **Final:** After Final Approval by NCDEQ PWS Section is granted, confirm all valves are fully open and flow all fire hydrants.

C. PRESSURE TESTS & LEAKAGE

The Contractor shall hydrostatically test completed sections of water line, including service lines, fire hydrants, and fittings with water. OWASA reserves the right to test all lines connected to the OWASA system. This testing, however, does not relieve the Contractor of their responsibility to repair or replace all workmanship and defective pipe. All work necessary to secure a tight line shall be done at the Contractor's expense. Testing shall be performed in the presence of OWASA's Representative.

All additions or replacements to water system, including water services, fire lines and backflow prevention devices, shall be tested. Such work must take place under the supervision of OWASA's Representative.

The newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for two hours to a leakage test with a beginning test pressure of 150% of design working pressure, but no less than 200 psi. The test pressure shall be slowly brought to the designated pressure by use of a hand pump or power pump. Only OWASA personnel shall operate water valves on OWASA's existing water system. Extreme care shall be used to prevent backflow into the potable water supply. The lines should be allowed to stand under pressure for a period of 24 hours prior to the test. Air should be vented from all high points just prior to the test. Only clean water, free of dirt and other debris, from a clean container shall be used for testing. The Contractor shall notify OWASA's Inspector a minimum of **5 business days** in advance of any expected test. The Contractor shall pretest all mains for a period of 2 hours before notifying OWASA for a final pressure test. No final pressure test will begin after 2:00 PM. The maximum allowable leakage shall be no greater than allowances shown in Section 5.2, Table 5A - Hydrostatic Testing of AWWA C600 (excerpt at the end of this Section). No leakage shall be allowed for services.

OWASA's Representative will verify 1 pressure test – the final observation of the test section. A fee will be charged if the OWASA Representative is required to make more than 1 trip to verify a pressure test on the same section of main being tested.

1) Acceptance Tests

- a. **Pressure Test:** Subject the pipe system to a hydrostatic pressure test. Raise the pressure by pump to 200 psi, 150% of system design working pressure, or test pressure as shown on the drawings, whichever is greater. Measure pressure at the high point on the system compensating for gauge elevation. A pressure loss greater than 5 psi over a 2-hour period results in an automatic failure of test. Pressure loss less than 5 psi (between 200 and 195 psi) is acceptable if the allowable leakage permitted (shown in table 5A AWWA C600) is not exceeded. All water used to determine the amount of leakage shall be measured thru a water meter (measuring in tenths of a gallon) approved by the OWASA Representative. Tests that exceed the allowable leakage are deemed failed and the Contractor shall determine cause, repair, and repeat the test until successful. Contractor shall be responsible for all labor, materials, and equipment to perform the testing.
- b. **Leakage Test:** Leakage shall be defined as the quantity of water that must be supplied into the pipe to attain the initial test pressure, after all air in the pipeline has been expelled and the pipe has been tested for duration of 2 hours. Leakage shall not exceed the quantity determined by AWWA C600.

If leakage exceeds allowances, the Contractor shall be responsible for locating and repairing leaks and retesting of line until successful.

No leakage will be allowed for 2-inch mains regardless of material.

D. DISINFECTION AND BACTERIOLOGICAL TESTING

Pipe Disinfection: Comply with ANSI/AWWA C651. The Contractor shall disinfect water mains and accessories in accordance with the procedures listed in AWWA C651 and meet the requirements of OWASA, whichever is more stringent.

1) Forms of Chlorine For Disinfecting

- a. **Calcium Hypochlorite:** Two forms are available – granular and tablets (both with 65% available chlorine). It will normally require 6.5 lbs. of Calcium Hypochlorite to produce a concentration of 50mg/L of available chlorine in 10,000 gallons of water. (Warning Note: *This chemical must not be used on solvent-welded or on screwed-joint steel pipe because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite!*)
- b. **Sodium Hypochlorite** is supplied in strengths of 5.25% to 16% available chlorine. The required amount of sodium hypochlorite to produce a 50mg/L concentration of available chlorine in 10,000 gallons of water can be calculated from the following formula:

Gallons of Sodium Hypochlorite needed = $50 \div \% \text{ of available chlorine}$

2) Methods Of Chlorine Application

The Contractor will inject a chlorine solution as specified in AWWA Standard C651, latest revision, into the water main.

Chlorination shall be in accordance with the following guidelines for calcium hypochlorite granules:

Pounds of Calcium Hypochlorite Granules per 1000 feet of pipe to provide 100 ppm	
6-inch diameter pipe	1.9 lbs.
8-inch diameter pipe	3.33 lbs.
12-inch diameter pipe	7.5 lbs.
16-inch diameter pipe	13.4 lbs.
24-inch diameter pipe	30.1 lbs.

- a. The chlorine solution shall be injected in the section of the main nearest an existing main. The chlorine solution shall result in a chlorination concentration of 100 ppm or greater. Chlorine injected on Friday yielding a 48-hour contact time of 20 ppm must be achieved or samples cannot be collected, on a case-by-case basis, 50 ppm chlorine concentration with a 24-hour contact time yielding 20 ppm may be accepted. Manually operated pumps shall not be used to inject the solution into the main.

b. Application for Continuous Feed and Slug Method

Taps will be made at the control valve at the upstream end of the line and at all extremities of the line including valves. These taps shall be located in such a manner as to allow chlorine solution to be fed into all parts of the line.

The chlorine solution shall be circulated in the main opening of the control valve while systematically manipulating hydrants and taps at the line extremities. The chlorine solution must be pumped in at a constant rate for each discharge rate in order that a uniform concentration will be produced in the lines.

c. Continuous Feed Method

Potable water shall be introduced into the pipe main at a constant flow rate. Chlorine shall be added at a constant rate to this flow so that the chlorine concentration in the water in the pipe is a minimum of 100mg/L. The chlorinated water shall remain in the main at 48 hours, after which, the chlorine concentration in the water shall be at least 20mg/L. All valves and appurtenances shall be operated while the chlorinated water remains in the main.

d. **Slug Method**

The slug method shall be as described in AWWA C651 and the following requirement. The water shall receive a chlorine dosage, which will result in a chlorine concentration of 100mg/L in a “slug” of the water.

3) **Bacteriologic Tests-General**

Before the water main is placed in service, all samples shall be collected at regular intervals not exceeding 1,200 feet and tested for bacteriologic quality and shall show the absence of both background growth (gram positives) and coliform organisms.

- a. Bacteriological testing shall comply with AWWA C651. All samples shall be tested for bacteriological (chemical and physical) quality in accordance the Standard Methods for the Examination of Water and Wastewater and shall show the absence of coliform organisms and the presence of chlorine residual.
- b. Purity Testing includes a series of tests that must be taken on two consecutive days. Samples cannot be collected if any type of precipitation is falling unless, an acceptable protective covering (approved by the OWASA Representative) is constructed suitable to prevent contamination.
- c. All sampling pipe shall be either brass or PVC and as shown in Standard Details 514.07, 514.08 and 514.09.
- d. The Contractor is responsible for furnishing all material, construction of sampling points and performing all labor associated with collecting samples. Temporary pipes used for sampling shall be composed of sections of vertical pipe terminating into a 90-degree horizontal bend and nipple at least 18 inches above ground level. Copper tubing used for sampling shall terminate horizontally with the ground, at least 18 inches above ground level. Samples will not be taken from a hose.
- e. **Sampling Log:** OWASA's representative will prepare a Sampling Log, including a sketch of the sampling points, as specified by OWASA's chemist. An OWASA Representative will collect the samples and deliver them to the OWASA Laboratory. Day 1 samples can be taken on Monday or Tuesday during regular business hours. Day 1 samples cannot be collected on Wednesday. Day 2 samples collected on Wednesday must be received in the laboratory by 3:00 p.m. The normal turnaround time for OWASA's laboratory to acquire results is 3 working days.
- f. **Sampling Costs:** Samples will be taken at each discharge point for Day 1 and Day 2 sampling free of charge. If purity testing fails on either Day 1 or Day 2, OWASA's Inspector will resample each discharge point at no cost. However, a charge will be assessed after the second set of samples has failed. Cost will be based on time, travel, equipment and material used/expended to collect and obtain results.

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate. Day 1 results will not be available until 24 hours after sample has been run by lab. If laboratory results indicate the presence of coliform bacteria, the samples are unsatisfactory. If laboratory results indicate background growth masking the detection of coliform bacteria, the sample will be considered unsatisfactory. If the line fails either Day 1 or day 2 sampling, the main shall be re-chlorinated by the Contractor and new tests performed prior to moving to the next section of main. OWASA will furnish water and operate the control valves for these operations. The Contractor shall be responsible for loading, removal, hauling, and discharging of water.

Samples for bacteriological analysis shall be collected for each section of pipe between main line valves after flushing is completed.

Primary sampling points are blow-offs, 2-inch setters and all fire lines. Sampling will be allowed at hydrants only if no other acceptable sampling point is available. All work required shall be at the Contractor's expense.

4) New Water Main Disinfection And Purity Testing – Procedure

STEP 1: Disinfection

The Contractor is responsible for furnishing all taps and materials required to satisfactorily disinfect the water system. All sample points shall be setup as shown in Standard Detail 514.07, 514.08 or 514.09 as applicable. The following steps will be completed by OWASA and the Contractor cooperatively.

- a. OWASA's representative will witness the flushing of the section of main to be disinfected until turbidity readings indicate 1.0 or less NTU.

Minimum blow-off sizes:	
2" – 8" lines	2" blow-offs
12" lines	4" blow-offs
16" & larger lines	6" blow-offs

The Contractor is responsible for adequate disposal of the large volumes of water generated from flushing and de-chlorinating.

- b. The Contractor will inject a chlorine solution as specified in Section 3.4 of this 02510, into the water main.
 - i. Do not use manually operated pumps to inject the solution into the main.
 - ii. The chlorine solution shall result in a chlorine concentration of 100 ppm or greater.
 - iii. The chlorine solution should be injected in the section of main nearest an existing water main.

- c. OWASA's representative will witness water being drawn from the following areas until 100 ppm chlorine concentration has been measured at all points of discharge at which time each point will be closed:
 - End of the main,
 - Hydrants,
 - Lateral lines, and
 - Other connections as necessary.
- i. OWASA's representative will witness the closing of all control valves feeding water into the main.
- ii. The chlorine concentration shall not drop below 20 ppm within a minimum period of 48 hours.
- iii. After the 48-hour period expires, OWASA's representative with the assistance of the Contractor will check the chlorine concentration to confirm that it has not dropped below 20 ppm. Day 1 samples will not be collected if the concentration is below 20 ppm after contact time has ended.

STEP 2: Preparing for Purity Testing

The Contractor is responsible for furnishing all material and constructing sample points. (See Standard Detail 514.07, 514.08, 514.09) For Blow off 4" and larger consult OWASA Representative.

- a. OWASA's representative is responsible for preparing a Sampling Log that includes a sketch of sampling points, which is specified by OWASA's Chemist.
- b. The Contractor must ensure that each sample point terminates horizontally 18" or greater above ground level, but no more than 36".
- c. **SAMPLES WILL NOT BE TAKEN FROM A HOSE.**

Now the water main is ready for purity testing which includes a series of tests that must be taken on two consecutive days. The normal turnaround time for OWASA's Laboratory to acquire results is about three working days. Day 1 samples can only be taken during normal business hours on Monday or Tuesday. Day 2 samples may be collected on Wednesday, but must be received in the OWASA Laboratory by 3:00 p.m. Samples collected but not received in the Laboratory by 3:00 p.m. on Wednesday will be considered failing and re-chlorination must be completed.

STEP 3: Purity Testing

OWASA is responsible for collecting and approving samples. ONCE THE CONTROL VALVE HAS BEEN OPENED AND WATER FLOW HAS BEGUN THROUGH THE NEW WATER MAIN THE FLOW SHALL NOT BE STOPPED, THE BLOWOFF/DISCHARGE POINT SHALL NOT BE CLOSED

UNTIL ALL SAMPLES HAVE COLLECTED. THE BLOWOFF/DISCHARGE POINT SHALL NOT BE CLOSED, EITHER UNTIL THE CONTROL VALVE(S) HAVE BEEN CLOSED OR SIMULTANEOUSLY.

SAMPLING – DAY 1

- a. OWASA's Representative with assistance from the contractor will check both chlorine concentration and turbidity.
- b. If the chlorine concentration and turbidity are within limits, OWASA's inspector will collect samples from the new main and from an approved/control water main in the distribution system.

Obtaining a control sample allows the laboratory to compare the water quality in the distribution system with that in the new water main.

- c. On the day of collection, OWASA's Representative will deliver the collected sample to OWASA's Laboratory either on Monday or Tuesday before 5:00 p.m.
- d. OWASA's Laboratory personnel will conduct a Colilert® bacteriological test. This test requires 24 hours of incubation before the result is obtained. The Laboratory begins these tests around 3:30 p.m. on Monday, Tuesday and Wednesday. Samples delivered on Monday and Tuesday after 3:00 p.m. will be refrigerated and Colilert test run the following day.
- e. The Colilert® results must be negative for coliform and E. Coli bacteria.
 - i. If the samples from the water main are positive (fail), the main must be disinfected again which means Step 1 must be repeated in its entirety.
 - ii. In the rare event that the samples from the control main are positive (fail), the new main must be disinfected again which means Step 1 must be repeated in its entirety.

Laboratory personnel will also conduct a Heterotrophic Plate Count (HPC) bacteriological test. This test required 48 hours incubation before the result is obtained.

The HPC result must be less than or equal to 500 CFU (colony forming units/ml).

If the results from the control main are greater than 500 CFU, the control main must be flushed and re-sampled at a later date. This is not a responsibility of the contractor to perform.

SAMPLING – DAY 2

- a. The water main shall not be flushed again.
- b. OWASA's Inspector will check both chlorine concentration and turbidity.

If the chlorine concentration and turbidity are within the limits, OWASA's Representative will collect samples from the new main and from an approved/control water main in the distribution system. Samples will be collected from the same discharge points as in Day 1.

- c. Laboratory personnel will conduct a Colilert® bacteriological test. **This test required 24 hours of incubation before the result is obtained.** (If results are positive, step 1 must be repeated).
 - d. In the rare event that the samples from the control main are positive (fail). The new main must be disinfected again which means Step 1 must be repeated in its entirety.
- 5) **Dechlorination:** Water containing even very small concentrations of chlorine or chloramines is harmful to aquatic life in the receiving streams. The state standard for water entering surface waters should be below 17 ppb for total residual chlorine (NCDEQ- Division of Water Resources' "Red Book" Surface Water and Wetland Standards NC Administrative Code 15A NCAC 02B.0100 and .022). Therefore, no discharge of chlorinated water into a storm sewer or a stream will be permitted unless the discharge is first treated by a neutralizing chemical applied to the water to be wasted to neutralize thoroughly the residual chlorine. A de-chlorinating device is required. The use of tankers or pools to hold chlorinated water will not be permitted. Disposal of chlorinated water shall be by as outlined in the following: 1. For water with chlorine residuals between .1 and 4.0 ppm a tablet form (sodium sulfite 81.3%) of de-chlorination shall be used thru an acceptable de-fuser approved by the OWASA Representative. 2. **ONLY APPLIES TO DIRECT STREAM DISCHARGE.** For water with chlorine residuals between .1 and 4.0 ppm only Vita-D-Chlor or Enviro-C tablets (ascorbic acid) shall be used if the discharged water goes directly into the stream. The appropriate de-fuser with tablet screen is required 3. For water with chlorine residuals above 4 ppm a liquid form (Calcium thiosulfate 20-30%) of de-chlorination shall be used. This chemical shall be run thru an acceptable de-fuser which allows the chemical to be gravity feed (at the appropriate rate) or siphoned (at the appropriate rate) directly into the water flow. And meet the applicable sections of AWWA C651, latest revision. See Standard Detail 514.07, *Purity Sampling Connection Detail for 2" Blow Off Line*, Standard Detail 514.08, *Purity Sampling Connection Detail on Fire Hydrant*, and Standard Detail 514.09, *Purity Sampling Connection Detail at Backflow Preventer*.

3.5 FINAL ACCEPTANCE

Upon completion of water main installations and prior to acceptance, the Contractor shall provide adequate and competent personnel to conduct, in conjunction with the OWASA Representative, an inspection of each valve and hydrant on the newly completed main. The purpose of this inspection shall be to ensure the operability and location of each valve and to further ensure that all valves are left in the open position.

Fire hydrants shall be greased and painted.

Flow tests are to be performed on each hydrant to verify both that flows are in line with the design flows and that all line and leg valves are open.

AWWA C600 TABLE 5A
HYDROSTATIC TESTING ALLOWANCE PER 1,000 FT OF Pipeline - gph
(Allowable Leakage per 1000 ft. of Pipeline * in gph)
(This table is excerpted from AWWA C600, Section 5.2 Table 5A)

AVERAGE TEST PRESSURE PSI	NOMINAL PIPE DIAMETER-IN.								
	4	6	8	12	16	24	30	36	42
450	0.57	0.86	1.15	1.72	2.29	3.44	4.30	5.16	6.02
400	0.54	0.81	1.08	1.62	2.16	3.24	4.05	4.86	5.68
350	0.51	0.76	1.01	1.52	2.02	3.03	3.79	4.55	5.31
300	0.47	0.70	0.94	1.40	1.87	2.81	3.51	4.21	4.92
275	0.45	0.67	0.90	1.34	1.79	2.69	3.36	4.03	4.71
250	0.43	0.64	0.85	1.28	1.71	2.56	3.21	3.85	4.49
225	0.41	0.61	0.81	1.22	1.62	2.43	3.04	3.65	4.26
200	0.38	0.57	0.76	1.15	1.53	2.29	2.87	3.44	4.01
175	0.36	0.54	0.72	1.07	1.43	2.15	2.68	3.22	3.75
150	0.33	0.50	0.66	0.99	1.32	1.99	2.48	2.98	3.48
125	0.30	0.45	0.60	0.91	1.21	1.81	2.27	2.72	3.17
100	0.27	0.41	0.54	0.81	1.08	1.62	2.03	2.43	2.84
If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.									



02530 – SANITARY SEWER

(Last revised 01/01/2025)

SUGGESTED SEARCH WORDS FOR THIS SECTION

Part 1 – General	Line Air Pressure Test - Table	Pump Station & Force Mains
Part 2 – Products	Low Press Air Test Gravity Lines	PVC Pipe
Part 3 – Execution	Manhole Corrosion Protection	Service Connections
Bypass Pumping	Manhole Plugs	Steel Encasement Pipe
Concrete Encasements	Manholes Precast - Spec	Testing
Ductile Iron Pipe - spec	Manhole Vent Pipes	Tunneling
DIP Fittings	Manhole Vacuum Test	Tunnel Liners
Iron Castings	Pipe Laying	UV Damage Protection
KOR-N-SEAL	Pipe Separation Requirements	

PART 1 – GENERAL**1.1 RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.

Section 02275 – TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES.

1.2 SUMMARY

This section includes sanitary sewer piping and specialties for municipal sewer and services outside of building structures. **All discharges to sanitary sewer shall conform to OWASA's Sewer Use Ordinance.**

1.3 DEFINITIONS**A. GENERAL**

For the purposes of this specification, the following definitions refer to sanitary sewer collection and pressure systems that come under the authority of OWASA as specified within this section and other sections of this manual.

- 1) **Cleanouts:** A riser pipe off of a service line that provides access to the line for the purpose of line cleaning.
- 2) **Easement:** An instrument that depicts/describes and conveys rights and privileges to OWASA for the placement, access to and maintenance of a utility line across and/or on the property of a second party. Ownership of the land remains with the second party.
- 3) **Sanitary Sewer:** Exterior gravity or pressure public sanitary sewer systems.
- 4) **Force Main:** Pressure sanitary sewer systems.
- 5) **Lift/Pump Station:** A combination wetwell/pump station and appurtenances.

- 6) **Sewer Service:** Exterior domestic sewer piping which connects to the public sewer system.

B. INDUSTRY ABBREVIATION FOR VARIOUS PIPE MATERIALS

The following are industry abbreviation for various pipe materials:

AC: Asbestos Cement Pipe
CI: Cast Iron Pipe
DIP: Ductile Iron Pipe
RCP: Reinforced Concrete Pipe
PVC: Polyvinyl Chloride

1.4 PERFORMANCE

A. GRAVITY FLOW, NON-PRESSURE PIPING PRESSURE RATINGS

At least equal to the system test pressure.

B. FORCE MAIN PRESSURE RATINGS

Shall be equal to the system operating pressure PLUS 50 PSI, but no less than 200 psi.

1.5 SUBMITTALS

A. PRODUCT DATA SUBMITTAL

Submit product data for the following. For third party projects, the Developer/Project Engineer shall perform all product review and make a submittal at the end of the project to OWASA.

- 1) Piping specialties.
- 2) Air & vacuum release valves and accessories.
- 3) Autodialers.
- 4) Sewage pumps and appurtenances, operating manuals.
- 5) Auxiliary generators.
- 6) Alarm devices.
- 7) Precast concrete manhole castings.
- 8) Piping paint.

B. SHOP DRAWING SUBMITTAL

Submit shop drawings for precast concrete vaults and wetwells, including frames and covers, ladders, drains, access hatches, wall sleeves, valve support stands, pumps, and motors.

C. COORDINATION DRAWINGS

Show manholes and other structures in vicinity, pipe sizes and elevations, elevations of lift station elements such as influent lines, floats, etc.

D. COMPUTATIONS

- 1) Buoyancy calculations for wetwells, manholes, interceptor/outfalls, and mains with shallow cover.
- 2) Provide structural calculations for any elevated main and pier system where span of the main exceeds the joint length. Provide calculations for all aerial mains, and their supporting structures that are subject to hydrodynamic forces.

E. BYPASS PUMPING

Bypass pumping operations must be approved by OWASA before starting. Provide a detailed written plan of how the bypass pumping operation shall be performed two weeks prior to the operation. See Section 3.5 of this specification.

F. PROJECT CLOSEOUT

Submit 3 copies of manufacturer's maintenance and operation manuals on all sewage pumps and/or package lift stations and appurtenant devices.

1.6 QUALITY ASSURANCE

A. COMPLIANCE WITH CODES AND STANDARDS

Materials and operations shall comply with the latest revision of the Codes and Standards listed in Section 1.7, below.

B. PIPING MATERIAL MARKINGS

Piping materials shall be marked clearly and legibly.

1) Ductile Iron Pipe Markings

Ductile Iron Pipe shall show on or near bell:

- a. Weight,
- b. Class or nominal thickness,
- c. The letters "DI" or "Ductile,"
- d. Manufacturer's identifying mark,
- e. Year in which pipe was made, and
- f. Casting period.

2) Steel Pipe Markings

Each length of steel pipe and each special section shall be legibly marked by paint stenciling, die stamping or hot-roll marking to show the following:

- a. Manufacturer's name or mark,
- b. Size and weight of the pipe or special section,
- c. The type of steel from which the pipe or special section was made.

3) PVC Pipe Markings

PVC pipe shall be marked at a maximum of every 5 feet in accordance with AWWA C900 as follows:

- a. nominal size in inches and outside diameter base;
- b. PVC;
- c. dimension ratio;
- d. Pressure class in pounds per square inch;
- e. the hydrostatic integrity test pressure;
- f. AWWA designation (ANSI/AWWA C900);
- g. manufacturers name or trademark and production run record or lot code;
- h. NSF 61, or if not intended for potable water “NOT FOR POTABLE USE”; and
- i. for deflectable joints, the maximum allowable axial joint deflection in degrees.

C. DESIGN STANDARDS

- 1) “Gravity Sanitary Sewer Design and Construction,” ASCE Manuals and Reports on Engineering Practice – NO. 60, WEF Manual of Practice NO. FD-5.
- 2) ASTM D1784 – *Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds*
- 3) ASTM D2321 – *Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications*
- 4) ASTM D3034 – *Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings*
- 5) ASTM D3212 – *Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals*
- 6) ASTM F477 – *Elastomeric Seals (Gaskets) for Joining Plastic Pipe*
- 7) ASTM F679 – *Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings*
- 8) ASTM F1417 – *Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air*
- 9) AWWA C600: *Installation of Ductile-Iron Mains and Appurtenances.*
- 10) AWWA C900. *AWWA Standard for Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings*
- 11) AWWA M23: *PVC Pipe – Design and Installation*
- 12) DIPRA *Design of Ductile Iron Pipe*
- 13) NC Department of Environmental Quality, Division of Water Resources, NCAC Title 15A 02T *Regulations*, latest revision.
- 14) UNI-B-6 – *Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe*
- 15) UNI-PUB-6 – *Installation Guide for PVC Solid-Wall Sewer Pipe (4 - 48 in.)*
- 16) UNI-TR-3 – *Maintenance of PVC Sewer Pipe*
- 17) Uni-Bell PVC Pipe Association: *Handbook of PVC Pipe Design and Construction*

1.7 QUALITY STANDARDS

Materials and operations shall comply with the latest revision of the Codes and Standards listed below. Additional references are listed in Section Introduction 1.5.

AASHTO	American Association of State Highway Transportation Officials.
ACI	American Concrete Institute
ANSI	American National Standards Institute
AREMA	American Railway Engineering and Maintenance-Of-Way Association
ASCE	American Society of Civil Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Association
FS	Federal Specifications
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCMA	National Concrete Masonry Association
NPCA	National Precast Concrete Association
NSF	National Sanitation Federation International
OSHA	Occupational Safety and Health Administration
SDS	Safety Data Sheet
UL	Underwriters Laboratories, Inc.
Uni-Bell	PVC Pipe Association
WEF	Water Environment Federation

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

Materials used for the construction of gravity sewer, pressure mains and appurtenances in OWASA's sewer collection system shall be new, free of defects, and meet the highest standards set forth. An authorized OWASA representative must inspect, review, and

approve all materials to be used for sewer main and appurtenances prior to installation. At the option of OWASA, any material installed without inspection will have to be sufficiently removed for inspection and review.

A. PIPE CONDITION/PIPE EXAMINATION

- 1) **New Pipe Inspection:** Inspect materials thoroughly, including the interior, upon arrival. Examine materials for damage and to ensure that the right pipe has been delivered to the site. Remove damaged or rejected materials from site. Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times, and no pipe shall be used in the work that does not conform to the appropriate ASTM Specifications.
- 2) **Pre-Installation Inspection:** Prior to being installed, each section of the pipe shall be carefully examined for damage and conformity with these specifications. All pipe damaged or deemed not to conform to these specifications shall be rejected and removed from site. All pipe in which the spigots and bells cannot be made to fit properly, or pipe, which has chipped bells or spigots, will be rejected. The faces of all spigots ends and of all shoulders on the bells must be true. Examine bell and spigot for uniformity and smoothness of liner and barrel.

B. PIPE PROTECTION AND SUPPORT

- 1) Protect pipe coating during handling using methods recommended by the manufacturer. Use of bare cables, chains, hooks, metal bars, or narrow skids in contact with coated pipe is not permitted.
- 2) Prevent damage to pipe during transit. Repair abrasions, scars, and blemishes to the satisfaction of OWASA. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.
- 3) Observe manufacturer's directions for delivery and storage of materials and accessories.
- 4) Protect stored piping from entry of water or dirt into pipe. Protect bells and flanges of special fittings from entry of moisture and dirt.
- 5) Support stored pipe to prevent sagging or bending. **Pipe bundles shall be stored on flat surfaces with uniform support, be protected from prolonged exposure (six months or more for all pipe) to sunlight with a suitable covering (canvas or other opaque material), and air circulation shall be provided under any covering.** Plastic pipe, structures, and fittings shall not be stored in direct sunlight.
- 6) Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.
- 7) Construct piping to accurate lines and grades and support as shown in drawings or prescribed in specifications. When temporary supports are used, ensure that sufficient rigidity is provided to prevent shifting or distortion of pipe.

1.9 PRODUCT SUBSTITUTIONS

OWASA's Engineer will approve materials not specified but deemed equal, on a case-by-case basis. OWASA's Product and Design Review Committee (PDRC) meets on an "as-

needed” basis to evaluate new products for incorporation into these specifications. If submitting new products, submit in writing 60 days prior to meeting date. Documentation and samples of materials must be submitted to OWASA. New materials approved for the sewer collection system will be incorporated into these specifications after approval by the PDRC.

1.10 PROJECT CONDITIONS – SEPARATION OF SANITARY SEWER AND APPURTENANCES FROM WATER MAINS AND OTHER STRUCTURES

Follow the NCDEQ and OWASA standards, whichever is more stringent, for separation of water mains and sanitary sewers lines.

A. PARALLEL INSTALLATIONS

- 1) **Preferred/Normal Conditions:** Sewer mains or sewer manholes shall be constructed at least 10 feet horizontally from water lines whenever possible. The distance shall be measured edge-to-edge.
- 2) **Unusual Conditions:** When **preexisting** local conditions prevent a horizontal separation of at least 10 feet, OWASA may approve the sewer main or sanitary sewer manhole to be laid closer to a water line provided that:
 - a. The sewer line shall be placed in a separate trench, with elevation of the top of the sewer line at least 18 inches below the bottom of the water line; or
 - b. The sewer line shall be placed in the same trench as the water, and located to one side, on a bench of undisturbed earth, and the elevation of the top of the sewer line at least 18 inches below the bottom of the water main; or
 - c. Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA-approved Ductile Iron Pipe pressure-tested in place to 150 psi without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place.

B. SEWER MAINS CROSSING BELOW WATER MAINS

- 1) **Preferred/Normal Condition:** Sewer lines shall be constructed to cross below water lines whenever possible and shall be laid to provide a vertical separation of at least 18 inches between the bottom elevation of the water line and the top of the sewer.
- 2) **Unusual Conditions:** When **preexisting** local conditions prevent an 18-inch vertical separation as described in *Sewer Mains Crossing Below Water Mains, Preferred/Normal Conditions* (paragraph above), the following construction shall be used:

Both the sewer crossing above water line and the water line itself shall be constructed of AWWA-approved Ductile Iron Pipe with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.

C. SEWER MAINS CROSSING ABOVE WATER MAINS

Unusual Conditions: When **preexisting** local conditions prevent an 18-inch vertical separation, as described in paragraph B, *Sewer Mains Crossing Below Water Mains, Preferred/Normal Condition*, above, the following construction shall apply:

- 1) That a section of DIP sewer pipe, with water main type pipe joints, is centered at the point of the water crossing so that the joints are equal distant and as far as possible from the water main such that, for a 90- degree crossing, the water main type joints are a minimum of 10 feet on each side of the point of crossing.
- 2) Provide adequate structural support for the sewers to prevent excessive deflection of the joints, which can result in settling on and/or breaking the water line.
- 3) THE SEWER MAIN SHALL BE CONSTRUCTED OF FERROUS MATERIAL AND TESTED TO 150 PSI.

D. SEWER MAINS AND APPURTENANCES FROM OTHER UTILITIES AND STRUCTURES

- 1) **Horizontal Separation – Preferred/Normal Condition:** Sewer lines shall be constructed to provide at least 3 feet of horizontal separation from other utilities whenever possible. The distance shall be measured edge-to-edge along the vertical plane. **For asbestos cement water lines and gas lines provide a minimum 5 feet of clear horizontal separation.**

For buildings or other permanent structures, a minimum of 15 feet of clear horizontal separation, including roofs and building foundations, shall be provided for mains up to 15 feet deep. Separations for sewer mains greater than 15 feet deep, larger than 12-inch diameter, or where incapable of meeting separation requirements due to preexisting site constraints will be determined on a case-by-case basis.

Other Separations

Manholes	10 feet
Air Release Valves	10 feet
Vaults	10 feet
Underground Stormwater	
Control Measures	10 feet*
Permeable pavers	5 feet*
Other Appurtenances	5 feet

***Note:** If separations from underground stormwater control measures and permeable pavers cannot be maintained, OWASA may consider allowing construction in accordance with creek crossings as an alternative.

- 2) **Vertical Separation – Preferred/Normal Condition:** Whenever it is necessary for another utility to cross a sewer main, a 12-inch vertical separation shall be maintained between the lines. When local conditions prevent a 12-inch vertical separation, the following construction shall apply:

- a. Provide adequate structural support for the utility to prevent excessive deflection of the joints, which can result in settling on and/or breaking the sewer line.
- b. A 24" VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES OR FERROUS PIPE SPECIFIED.

E. SANITARY SEWER MANHOLES

No water main shall be allowed to pass through or come in contact with any part of a sewer manhole. A minimum of 10 feet of horizontal separation shall be maintained between water mains and sanitary sewer manholes provided that the applicable provisions of paragraph A, *Parallel Installations, Unusual Conditions*, above, are also met.

F. STORM DRAINAGE SYSTEM

No gravity sewer or sewer lateral shall pass through a storm drain pipe or manhole system.

G. NEW UTILITIES AND EXISTING SEWER MAINS

When installing a new utility adjacent to or in close proximity to an *existing* sewer main, the new utility line shall be installed to provide the minimum horizontal and vertical clearances specified in paragraph D, *Sewer Mains and Appurtenances From Other Utilities and Structures*.

H. PROTECTION OF WELLS

No gravity sewer, force main, or manhole structure shall pass or be placed within 25 ft of a private well or 50 feet of a public water supply well, source or structure. This offset distance assumes that the sewer is constructed of materials and joints equivalent to state water main standards. If not, the minimum separation is 100 feet.

1.11 COORDINATION OF SERVICE INTERRUPTIONS

Contact OWASA Construction Inspector to coordinate interruption of services. If interruption is necessary, the interruption shall be arranged to occur at such a time to cause the least disruption and minimize loss of service. At the direction of OWASA's Engineer, temporary service may be required to be provided. Provide a minimum of 10 working days' notice of the proposed utility interruption.

1.12 LOCATE SERVICES

Contact **"NC One Call"** 1-800-632-4949 or "National Call Before You Dig" at 811 before digging.

PART 2 – PRODUCTS

2.1 PIPE & FITTINGS

The following references provide the minimum standards as they apply to the specific item listed. In all cases, the latest revision shall apply. **The pipe material selected shall be adapted to local conditions, such as: soil characteristics, exceptionally heavy external loadings, abrasion, corrosion, and similar problems. Consideration shall also be given to pipes and compression joint materials subjected to corrosive or solvent wastes. The pipe interior, sealing surfaces, fittings, and other accessories shall be kept clean.**

A. ACCEPTABLE PIPE MATERIAL

- 1) Refer to Section 3 Water and Sewer Design for additional design information. Use pipe, fittings, and joining methods according to the application indicated.
- 2) RCP and VCP gravity pipe are not permitted.

B. DUCTILE IRON PIPE

Ductile iron pipe shall be manufactured in accordance with all applicable requirements of AWWA C151/ANSI A21.51 and ASTM A746, pressure class rated, class 350, unless otherwise approved by the OWASA Engineer. The thickness of Ductile Iron Pipe shall be determined by considering trench load in accordance with ANSI/AWWA C150/A21.50 (Public Sewers shall be no less than 8-inch diameter).

All pipe and fittings 6 inches and larger shall be lined with a calcium aluminate mortar made of fused calcium aluminate cement and fused calcium aluminate aggregates. The thickness of the lining shall be the thickness identified on AWWA C104, latest revision but no less than 1/16 inch for 6-inch through 12-inch and 3/32 inch for 14-inch through 24-inch pipe. The lining thickness may taper to less than the specified at the ends of the pipe. Cracks, other than closed hairline cracks and/or fine crazing shall not be acceptable. Loose areas of cement lining are not allowable. A seal coat shall be applied to the lining as identified on AWWA C104.

Epoxy Liners: Protecto 401 and Novocoat SP-2000W are acceptable linings when pipe is to be used for sewer only.

Outside coat shall be a minimum of 1 mil bituminous paint according to ANSI/AWWA C151/A21.51.

Each joint of ductile iron pipe shall be hydrostatically tested before the outside coating and inside lining are applied at the point of manufacturer to 500 psi. Testing may be performed prior to machining bell and spigot. Failure of ductile iron pipe shall be defined as any rupture or leakage of the pipe wall.

All materials used in production of the pipe are to be tested in accordance with AWWA C151 for their adequacy within the design of the pipe, and certified test results are to be provided to OWASA upon request. All certified tests, hydrostatic and material are to be performed by an independent testing laboratory at the expense of the pipe manufacturer.

Push-on and mechanical joint pipe shall be as manufactured by the American Cast Iron Pipe Company, McWane Ductile, or United States Pipe and Foundry Company.

1) Ductile Iron Joints

Pipe joints may be either push-on or mechanical joint pipe sizes 4 inches through 48 inches in diameter. Rubber Gasket Joints and Mechanical Joints shall comply with AWWA C111/ANSI A21.11, ASTM A536. Acceptable pipe joints are as follows:

- a. **Gravity Main Push-on Joint, Ductile Iron Pipe** shall conform to AWWA C151/ANSI A21.51 (such as “Fastite” or “Tyton”). The dimensions of the bell, socket, and plain end shall be in accordance with the manufacturer’s standard design dimensions and tolerances. The gasket shall be of such size and shape to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal. Gaskets shall be manufactured with an approved elastomeric material and comply with AWWAC111/ANSI A21.11.
- b. **FORCE MAIN Push-on Joint Ductile Iron Pipe:** Gaskets shall be manufactured with an approved elastomeric material, and comply with AWWA C111/ANSI A21.11. and shall be as manufactured by American Pipe (Fast-Grip), US Pipe (Field Lok 350), or McWane Ductile (Sure Stop 350). The pipe shall conform to AWWA C151/ANSI A21.51 (such as “Fastite” or “Tyton”). The dimensions of the bell, socket, and plain end shall be in accordance with the manufacturer’s standard design dimensions and tolerances. The gasket shall be of such size and shape to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal.
- c. **Mechanical Joint, Ductile Iron Pipe** shall be used only at the specific locations indicated on the drawings or as approved by OWASA’s Engineer.
 - i. The mechanical joint shall consist of:
 - a) A bell cast integrally with the pipe or fitting and provided with an exterior flange having cored or drilled bolt holes and interior annular recesses for the sealing gasket and the spigot of the pipe or fitting;
 - b) A pipe or fitting spigot;
 - c) A sealing gasket;
 - d) Separate ductile iron follower gland having cored or drilled bolt holes; and
 - e) Ductile iron tee head bolts and hexagon nuts.
 - ii. The joint shall be designed to permit normal expansion, contraction, and deflection of the pipe or fitting while maintaining a leak proof joint connection. The mechanical joint shall conform to the requirements of Federal Specification WW-P-421, AWWA C111/ANSI A21.11, and ASTM A536.

- iii. **Mechanical Joint Bolt Torque:** See Section 3.1.B, paragraph 2, *Mechanical Joint Bolt Torque*, below.

2) DUCTILE IRON FITTINGS

Fittings shall be ductile iron at least class 54 thickness and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 for compact fittings. All ductile iron fittings shall have a minimum working pressure rating of 250 psi and minimum iron strength of 25,000 psi. All fittings shall be high alumina cement mortar lined in accordance with ANSI/AWWA C104/A21.4, fittings 6" and larger shall be lined with Protecto 401 or Novocoat SP-2000W and the outside shall be bituminous coated. The fittings shall be tested and the manufacturer shall provide certified test results when requested by OWASA. This testing shall include hydrostatic proof testing of fittings. Acceptable types of fittings shall be Mechanical Joint.

Mechanical Joint Fittings: Restraint shall be Megalug series 1100 mechanical joint restraint by EBAA Iron Sales, Inc., Ford wedge action restrainer gland UFR Series 1400, Sigma "One-Lok", Star Products-StarGrip 3000, SIP-EZ Grip, or approved equal. Ductile Iron fittings shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 (compact). Glands, Gaskets and Bolts shall conform to AWWA C111/ANSI A21.11.

C. PVC PIPE

- 1) **General:** C900 PVC gravity and pressure pipe shall comply at a minimum with AWWA C900, Pressure Class 235, DR 18, unless otherwise approved by the OWASA Engineer, and shall be green for sewer applications. PVC may be used for 2-inch through 16-inch mains, supplied in 12.5-foot lengths with bell end with gasket and spigot end joints, and for 4-, 6-, and 8-inch laterals. Pipe shall also meet all applicable ASTM Standards, including ASTM D2122, ASTM 3034, and ASTM D3139, and certified test results are to be provided to OWASA upon request. Pipe shall have a bell with an integral wall section with a factory installed, solid cross section elastomeric ring meeting ASTM F1336 and in accordance with ASTM F477. All certified tests, hydrostatic and material are to be performed by an independent testing laboratory at the expense of the pipe manufacturer.

Public Sewers shall be no less than 8-inch diameter. The minimum thickness of PVC Pipe shall be determined by considering trench load and maximum depth in accordance with ANSI/AWWA C150/A21.50.

If pipe must pass through an area contaminated with or subject to contamination with low-molecular-weight organic solvents or petroleum products, documentation from the manufacturer regarding permeation and the suitability of PVC pipe in the installation must be provided.

2) PVC Joints

PVC pipe shall be IB gasketed integral bell with spigot end.

3) PVC Fittings

PVC fittings shall be made for use with AWWA C900 pipe made from virgin PVC satisfying the manufacturing and long-term performance requirements of AWWA C907 and be classified in accordance with ASTM D1784.

4) PVC Pipe for Sewer Force Mains (other than 2 inch)

PVC pressure pipe with bell end with gasket and spigot end shall comply with AWWA C900, Pressure Class 235, DR 18, or as directed by OWASA for the specific installation. C900 pipe shall be used with ductile iron or PVC fittings (restrained joint). PVC pipe for public sewer force mains shall require approval of the OWASA Engineer.

5) PVC Pipe for Sewer Force Mains (2 inch)

2-inch PVC pressure pipe, bell end with gasket and spigot end shall comply with ASTM D2241.

D. STEEL PIPE (Use of Steel Pipe – Approved on a Case-by-Case Basis)**1) Steel Pipe For Sewer Mains, Aerial Creek Crossings, Encasement, Boring Applications, And Vent Pipes**

Steel pipe for gravity sewer mains and aerial crossings shall meet the requirements of AWWA C200. Nominal pipe diameter and wall thickness shall be as indicated on the drawings. Pipe shall be high strength steel, spiral welded or smooth-wall seamless manufactured in accordance with ASTM A139, and ASTM A283/A283M, Grade “B” steel with a minimum yield strength of 35,000 psi. The interior lining shall be a coal-tar enamel coating as specified under AWWA C203.

- a. **Steel Pipe for Gravity Sewer Mains:** Pipe shall be seamless and either furnace-welded or electrically welded pipe, Grade A. The exterior coating shall be coal-tar enamel in accordance with AWWA C203.
- b. **Steel Pipe for Aerial Creek Crossings (*without encasement and carrier pipe*):** The outside of the pipe shall have one coat of zinc chromate primer conforming to Federal Specification TT-86-a and afterwards painted with coal-tar enamel.
- c. **Steel Encasement Pipe for Boring Applications:** Encasement pipe shall meet applicable NCDOT and AREMA specifications. For 24” and larger pipe, grouting in the annular space between carrier and casing pipe and certification of durability with a design life of 100 years is required by NCDOT. Casing pipe shall include pipe carriers (spiders) to support carrier pipe.
- d. The spiders necessary to support the carrier pipe inside of the steel encasement pipe shall conform to Standard Detail 517.01. Refer to **Standard Detail 517.01** for spider spacing.

- e. **Steel Vent Pipes for Manholes:** The vent pipe shall be made from 4-inch Schedule 40. The pipe shall be coated inside and out in accordance with AWWA C203 and a finish coat of paint (Hunter Green) applied to the exposed portion of the vent once installed on the manhole casting. See Standard Detail 532.05.

E. TUNNEL LINERS

- 1) Carrier pipe shall be restrained mechanical joint or other approved restrained joint ductile iron pipe with a minimum pressure class 350 rating.
- 2) Grout mix for filling voids in between carrier pipe and tunnel shall consist of the following materials properly mixed in proportions by weight.
 - a. Part Cement.
 - b. 3.0 Parts Fine Sand, 100 Percent Shall Pass No. 16 Sieve.
 - c. 0.5 to 0.6 Part Water.
- 3) Tunnel lining construction shall comply with the “*Specification for Steel Tunnel Liner Plates*” in the *AREMA Manual for Railway Engineering*. The design and shape of the liner plates shall be such that erection and assembly of the liner plate structure can be completely and readily effected from inside the tunnel. Plates shall be accurately curved to suit the tunnel cross section, and all dimensions shall be of the size and accuracy such that plates of similar curvature shall be interchangeable. All plates shall be connected by bolts on both longitudinal and circumferential joints.
- 4) The steel lining shall consist of plates 16, 18, or 24 inches wide. Each circumferential ring shall be composed of the number and length plates necessary to complete the required shape shown on the drawings. The nominal tunnel diameter shall be of sufficient size to install the carrier pipe.
- 5) Plates shall be one-piece steel meeting the requirements of ASTM A1011, or ASTM A1008. Plates shall have an ultimate tensile strength of at least 42,000 psi and yield strength of 28,000 psi. Gage thickness shall be a minimum of 8 gage. The liner plate and bolts shall be galvanized in accordance with ASTM A153. In addition, the liner plates shall be asphalt coated to meet *AREMA Manual for Railway Engineering*. For two flange plates, the minimum thickness shall be 0.135 inches. Plates shall be manufactured by Armco Steel Corporation, Commercial Shearing, Incorporated, Republic Steel Corporation, or equal.
- 6) Grout holes 1½ inches or 2 inches (or larger) in diameter shall be provided in each ring to permit grouting as the erection of the tunnel liner plates progresses. Grout hole screw plugs shall be provided in plates.
- 7) Steel bolts shall meet requirements of ASTM A449 for plate thickness equal to or greater than 0.209 inch and ASTM A307 for plate thickness less than 0.209 inch. The nut shall meet requirements of ASTM A 307, Grade A.

F. CARRIER PIPE FOR CASINGS AND TUNNELS

Carrier pipe shall be restrained mechanical joint or other approved restrained joint type of ductile iron pipe, and of the class indicated on the drawings.

2.2 MISCELLANEOUS APPURTENANCES AND MATERIAL

A. AIR AND VACUUM RELEASE VALVES

Combination Air Valves shall conform to the following:

Automatic Air and Vacuum Valves shall be infinitely variable automatic air and vacuum valves designed to allow escape of air, close watertight when liquid enters the valve and allow air to enter in the event of a vacuum. The valve shall be an NPT threaded Stainless Steel body. The valve outlet is to be protected from debris entering the outlet of the valve. Valves shall be all brass. Valves shall be designed for a maximum cold water pressure of 200 psig. Combination air and vacuum release valves shall be located as shown on the drawings or as otherwise directed by OWASA's Engineer. The valve shall be housed in a precast concrete eccentric manhole and shall be installed in accordance with Standard Detail 538.01. Acceptable Models are, X-Series (2-inch outlet) by Crispin-Multiplex Manufacturing Co. and 986 Stainless Steel by H-Tec Inc.

B. BEDDING

Bedding, backfill, and compaction shall be in accordance with Section 02275.

C. SOLID BRICK (FOR MODIFICATIONS TO MANHOLES)

Sold brick shall be hard clay, grade SM, in accordance with ASTM C32.

D. CONCRETE

Concrete classes (NCDOT) to Design Compressive Strength at 28 days (f'c):

Class	28-day Compressive Strength (f'c)
AA	4500 psi
A	3000 psi
B	2500 psi

Ready mixed concrete shall comply with ASTM C94. All exposed concrete shall be air entrained. Concrete strength shall be as specified on the standard details and drawings. Unless otherwise specified, all concrete shall be minimum Class A.

E. CONCRETE BLOCK (FOR MANHOLES)

Concrete block shall conform to the requirements of ASTM C139.

F. DETECTABLE WARNING TAPE AND TRACER WIRE

Tracer tape and tracer wire shall be installed per Section 02275.

G. MORTAR FOR CONCRETE BLOCK & CLAY BRICK

Mortar shall be type S, ASTM C 270 and ASTM C-144. Mortar shall be prepared from cement in perfect condition and shall be prepared in boxes for that purpose. No mortar that has stood beyond forty-five minutes shall be used. Proportion by volume for the different types of application shall be as follows:

Brick masonry = 1 part cement to 2 parts sand

Pointing = 1 part cement to 1 part sand

H. IRON CASTINGS: MANHOLE FRAMES AND COVERS

- 1) **General:** Manhole frames and covers shall be manufactured from Class 35B gray iron, meeting the requirements of ASTM A48 as noted in of AASHTO M306. Standard manhole frames and covers shall be built to the dimensions and configurations shown on Standard Details 533.01 and 533.02. Minimum inside diameter of the opening shall be 23 ½ inches. Manholes castings are to be uncoated. The bearing surface of the frames and covers shall be machined and the cover shall seat firmly into the frame without rocking. Covers are to be embossed along the perimeter with the name "OWASA" and with the words "Sanitary Sewer" and "Entry Permit Required." See Standard Details 533.01 and 533.02.

Watertight Frames and Covers: Watertight bolt-down frames and covers shall have 4 stainless steel bolts at 90 degrees and one polyvinyl gasket between cover and frame seat. Frame is to have four 1-inch diameter holes in flange at 90 degrees. Watertight frames and covers are to be utilized whenever a manhole top is set lower than 2-foot above the 100-year base flood elevation.

- 2) **Approved castings are:**

Manufacturer	East Jordan Iron Works	US Foundry	Capitol Foundry
Standard Model	V-1384	USF-669	MH -2001
Watertight Model (Bolt-Down)	Bolt-down V-2384	669-KL-BWT	MH-2001-WT
Cover Weight	135	125	120
Frame Weight	180	190	190

Note: Weights shall not deviate by – 5% from that shown in the above table.

An East Jordan Iron Works V-1883 or US Foundry 1261-KL is to be used with flat top manholes unless the top of the manhole is less than 2-foot above the 100-year base flood elevation. In that case a bolt-down watertight frame and cover is to be used.

- 3) Frame weights shall not vary more than 5%+/- from that shown on the standard details.

I. IRON CASTINGS: SEWER CLEANOUT BOX

General: Sewer cleanout frames and covers shall be manufactured from Class 30 gray iron, meeting the requirements of ASTM A48. Standard sewer cleanout frame

and covers shall be built to the dimensions and configurations shown on Standard Detail 534.01. Approved casting is Capitol Foundry model VB-9 By-Pass Valve Box and the US Foundry 7610 FC.

J. MANHOLE EXTERIOR JOINT SEALANT

Manhole castings shall be sealed to the structure with an “O” ring or “ram neck” joint seal and an external sealing system such as Infi-Shield® Uniband as manufactured by Sealing Systems, Inc. The seal shall be continuous bands, made of high-quality EPDM (Ethylene Propylene Diene Monomer) rubber with a minimum thickness of 60 mils. Each unit shall have a 2-inch wide mastic strip on the top and bottom of the band. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 3/16-inch, and shall seal to the cone/top of the manhole and over the lip of the casting.

The seams on each manhole joint section shall be sealed with a minimum of one layer of “ram neck” or O ring made of nonhardening butyl rubber and an external sealing wrap. Acceptable manufacturers of “ram neck” or O-ring are Conseal Concrete Sealants, Inc. item CS-202. The wrap shall be a minimum of 6” wide. Acceptable products are Gator Wrap as manufactured by sealing systems, Inc. See Standard Details 532.09 and 532.01.

K. MANHOLE FLEXIBLE INTERIOR COATING SEALANT

THIS PRODUCT IS TO BE USED ON ALL REHABILITATED MANHOLES LOCATED WITHIN THE PAVED ROADWAYS. Internal sealant system (see Standard Detail 532.06) shall prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone including all extensions to the chimney area. The seal shall remain flexible allowing for repeated vertical or horizontal movements of the frame due to frost lift, ground movement, or the thermal movement of pavement. The product shall have a minimum elongation of 800% and a Durometer hardness of 75. The manhole sealant shall conform to the physical requirements of ASTM D412. Sealant shall equal or exceed “Flex-Seal” as manufactured by Sealing Systems, Inc., Loretto, MN.

L. MANHOLE PLUGS

Manhole plugs shall be of the mechanical type and shall not rely upon air pressure to secure the plug to the inside of the pipe. The plug shall be of cast iron construction with a Neoprene rubber “O” ring. The plug shall be secured to the inside of the pipe by means of a large wing nut that, when tightened, compresses the Neoprene rubber “O” ring against the inside of the pipe. The plug shall include a minimum ½ inch diameter NPT by-pass. Backpressure on the plug shall not exceed the manufacturers recommended pressure ratings. Approved manhole plugs shall be Cherne Iron-Grip by-pass style mechanical plug or approved equal. See Standard Detail 532.04.

M. PORTLAND CEMENT

Type I, CSA normal, ASTM C150.

N. PRECAST REINFORCED CONCRETE STRUCTURES

1) General

Manholes of precast reinforced concrete shall be designed and manufactured in accordance with ASTM C478, latest revision. Manhole diameters shall be 4-ft. minimum. The wall shall be a minimum of 5 inches thick and have a 6-inch minimum base. Either an “O” ring or “ram neck” joint seal shall be used. The “O” ring joint shall conform to the requirements of ASTM C443, latest revision. The gasketed joint shall conform to ASTM C990 (or AASHTO M199), latest revision. Rubber boot and stainless steel clamps, meeting the requirements of ASTM C923 shall be supplied with the manhole bases to tie the pipe to the base section of the manhole. Concrete used in the construction of the manholes shall have a minimum 28-day strength of 4000-psi air entrained (with 4 to 6 percent air) conforming to ASTM C33 and ASTM C94/C94M. Manhole units shall consist of standard modular precast riser sections, modular riser sections, and a monolithic base (except doghouse bases are to be used when placing manholes over existing mains). Where conditions do not favorably accommodate the use of an eccentric cone, eccentric precast reinforced concrete flat tops are to be used. In areas of high H₂S concentration, provide protection of manhole by providing linings or coatings on the interior of the manhole such as Polyurethane (Sherflex by Sherwin Williams) PVC, Reinforced Thermosetting Resin (RTR), Strong-Seal Epoxy, or coal-tar epoxy. Manufacturer products shall be approved for use by NCDOT and be NPCA certified.

Manhole steps are not permitted.

Refer to the Standard Detail 532.01 for boot to pipe connection detail.

- 2) **Extended Bases:** Manholes over 12 feet in depth, as measured from top of casting to effluent invert, shall have extended bases with appropriate reinforcing.
- 3) **Drop Manholes:** Unless otherwise allowed by OWASA's Engineer, manholes will be precast reinforced concrete. New drop manholes shall be a minimum of 4 feet in diameter and shall be constructed in accordance with Standard Detail 532.03.
- 4) **Joint Seal:** The standard joint shall be sealed/parged inside and out with plastic cement putty meeting Federal Specification SS-C-153. All buried joints shall also have an Infi-Shield® Gator Wrap external sealing system, as manufactured by Sealing Systems, Inc., are to be placed on the perimeter of the manhole joint. Infi-Shield® Uniband shall be placed at the top of manholes where the iron casting mates with the precast concrete cone section and/or grade rings. See Infi-Shield® specification elsewhere in this specification. See also Standard Details 532.01, 532.06, and 532.09
- 5) **Flexible Pipe-to-Manhole Connector:** A flexible Pipe-to-Manhole connector shall be employed in the connection of the sanitary sewer to precast manholes. The connector shall be *KOR-N-SEAL*, as manufactured by NPC, Inc., Milford, New Hampshire, *PSX*, or equal.

The connector shall be the sole element relied on to assure a flexible watertight seal of the pipe to the manhole. No adhesives or lubricants shall be employed in the installation of the connector into the manhole. The rubber for the connector

shall comply with ASTM C923 and consist of EPDM and elastomers designed to be resistant to ozone, weather elements, chemicals, including acids, alkalis, animal and vegetable fats, oils and petroleum products from spills.

All stainless steel elements of the connector shall be totally non-magnetic Series 304 Stainless, excluding the worm screw for tightening the steel bands around the pipe, which shall be Series 305 Stainless. The worm screw for tightening the steel band shall be torqued by a breakaway torque wrench available from the precast manhole supplier, and set for 60-70 inch/lbs.

The connector shall be of a size specifically designed for the pipe material and size being utilized on the project.

O. SERVICES

1) Pipe

a. **Ductile Iron Services:** DI pipe for sewer services shall be minimum class 350 slip joint pipe with mechanical joint fittings. The service shall include the clean-out stack provided with a cast iron ferrule with brass clean-out plug. See Standard Detail 534.01.

b. **PVC Services:** PVC pipe for sewer services shall use a push on AWWA C900 DR 21, 200 psi in-line monolithic wye gasketed fitting and shall be constructed as shown on Standard Detail 534.01. The wye shall be supported with a concrete block to keep it from rotating under load. The service shall include the clean-out stack provided with a cast iron ferrule with brass clean-out plug. See Standard Detail 534.01.

2) **Service Saddles:** Sewer pipe saddles shall be Romac Industries, Inc. CB-4.80 (6-inch through 12-inch) or CB4.80LS (14-inch through 24-inch). See Standard Detail 534.01.

Service saddles may be used only on existing sewer mains. Tee/wyes shall be used for new construction.

3) **Inline Fittings:** Fittings for services on new main installation shall be inline Class 350 DI, AWWA C900 DR 21 Pressure Class 200 psi PVC, or stainless-steel wyes.

P. WETWELL/VALVE VAULT ACCESS HATCHES

1) **All Areas** (Low Density Traffic (incidental) H-20 Loading – 16,000 lb. wheel load on an 8 ½-inch x 20 ½-inch wheel area): The aluminum access frames and covers are provided with a ¼-inch thick structural grade aluminum channel frame with the flanges acting as a continuous concrete anchor. The inside of the frame has a continuous door support angle that must have a full bed of Class “A” concrete under both the frame and support angle. Door leaves shall be a minimum of ¼-inch thick aluminum diamond plate with structural grade aluminum. Door reinforcing shall withstand an H-20 live load designation. The doors also have lifting aids of aluminum tubular construction with compression springs to assist in opening and closing of the doors. The doors are provided with heavy-duty stainless steel hinges with tamper-proof fasteners. All hardware is to be stainless steel. The doors open to 90 degrees and lock automatically in that position with a

stainless steel positive locking arm and a stainless steel release handle. Doors are provided with a stainless steel lifting handle, stainless steel snap-lock with removable key handle. Two key handles shall be provided with each door. The door leaves extend to the outside perimeter of the frame for added support. Provide padlock hasp for doors on wetwells and valve vaults.

- 2) **Guarantee and Manufacturer:** The aluminum access frames and covers shall carry a 10-year guarantee against defects in materials and workmanship. The frame and cover shall equal or exceed the units manufactured by Halliday Products, Inc. or The Bilco Company.

Q. YARD HYDRANTS

Yard hydrants shall equal or exceed the Clayton Mark model 5451 Lever type Frostproof Yard Hydrant or the Woodford W-34 for $\frac{3}{4}$ -inch and the Woodford Y-1 for 1-inch. See Standard Detail 539.04.

PART 3 – EXECUTION

INSTALLATION – PIPE AND FITTINGS

3.1 PIPE AND FITTINGS

A. CONSTRUCTION – ALL PIPE

- 1) **Traffic Control:** All operations of the Contractor shall be subordinate to the free and unobstructed use of the right of way of the passage of Pedestrians and traffic without delay or danger to life, equipment, or property.
- 2) **Trench width** shall be in accordance with OSHA regulations and as shown in detail 531.01.
- 3) **Protection of Existing Sewers:** Sewer lines under construction shall be plugged with a mechanical plug at the first manhole upstream from the point of connection. Plug shall be placed in the outlet connection and secured with a steel cable. Plug shall remain in place until acceptance of lines by OWASA. Water, stone, dirt, or any other debris shall not be allowed to enter the OWASA sanitary sewer system during flushing operations or at any other time. Construction taking place in the vicinity of any existing OWASA sewer lines or manholes shall not cause any inflow of surface water or debris to enter the OWASA sanitary sewer system. Existing OWASA manholes located in construction sites are to remain accessible at all times. The Owner and/or Contractor shall be responsible for any damages incurred to the OWASA sanitary sewer system and any fines imposed by the State of North Carolina Division of Water Resources due to sewer spills or overflows.
- 4) **Pipe Laying Direction:** Place piping beginning at low point and progress uphill. Place on grade, with unbroken continuity in invert, horizontally and vertically, and on alignment as indicated on plans. Place bell ends of piping facing upstream. Install gaskets, seals, sleeve, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

- 5) **Directional Changes in Gravity Lines:** Use manholes for changes in direction of gravity lines.
- 6) **Stringing Out Pipe:** Only the amount of pipe that will be used in one day may be strung out. When pipe is strung out, it shall be set on high ground and in a position to prevent silt deposits, storm water, or other matter from entering the pipe prior to its placement in the trench.
- 7) **Pipe Laying:** The foundation for gravity sewer pipe shall be in accordance with Section 02275. The pipe and fittings shall be laid in the trench so that its interior surface shall conform to the grade and alignment as shown on the plans. Pipe laying shall be done in such a way as to disturb as little as possible the pipe that has already been laid. The alignment and grade of the sewer main may be field adjusted whenever, in the opinion of OWASA's Engineer, it is necessary, so long as the adjustments are within that allowed by NCDEQ based on regulations in effect at the time of the change and so long as the changes are consistent with OWASA's policy in effect at the time of the change. Changes in either grade or alignment may only occur at manholes.

Before laying, the bell and spigot will be wiped free from any dirt or other foreign matter. All surfaces of the portion of the pipe to be joined, and the factory-made jointing material, shall be clean and dry. Lubricants, primer, adhesives, etc., shall be used as recommended by the pipe or joint manufacturer's specifications. The jointing material or factory-fabricated joints shall then be placed, fitted, and adjusted in such workmanlike manner as to obtain the degrees of water tightness required.

Trenches shall be kept as dry as possible during bedding, laying and jointing and for as long a period as required until the trench is backfilled. As soon as possible after the joint is made, sufficient bedding material shall be placed along each side of the pipe to offset conditions that might tend to move the pipe off line or grade. The greatest care shall be used to secure water tightness and to prevent damage to or disturbing of the joints during the backfilling process, or at any other time.

All special fittings, such as wyes and other connections, shall be installed at the points indicated on the plans, in accordance with the standard detail drawings. Use appropriate adaptors to tie connection pipe to wyes or saddles. Plug end of connection with appropriate plug. See Standard Detail 534.01.

After the trench foundation has been properly graded to receive the pipe, the pipe shall be carefully lowered into the trench with approved methods. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench. All damaged pipe shall be replaced.

Any defects due to settlement shall be corrected by the Contractor.

- 8) **Temporary Suspension of Work:** When the trench is left for the night or if pipe laying is suspended, the upper end of the pipe shall be plugged to keep out dirt, water, animals and other foreign matter or substances. This plug shall be kept in the end of the pipe line at all times when laying is not in actual progress.
- 9) **Cutting or Fitting Pipe:** Whenever a pipe requires cutting, to fit in the line or to bring it to the required location, the work shall be done in a satisfactory manner

with an approved cutting tool or tools which will leave a smooth end at right angles to the axis of the pipe and not otherwise damage the pipe or liner. When the cut end is to be assembled in a *Fastite* bell, an adequately smooth (without sharp edges) bevel should be ground or filed on the cut edge to prevent damage to or dislodgement of the gasket during assembly. The method of cutting pipe shall be in accordance with manufacturer's recommendations. No welding, flame cutting, or flame tapping will be allowed. Such cuts shall be made by the Contractor.

- 10) **Surface Water Crossings:** Surface water crossings with pipe under streambed shall have the pipe encased in either a concrete or steel casing. Concrete or steel casing shall extend from top of stream bank to top of stream bank. See Standard Detail 536.08.
- 11) **Ravine/Channel Crossings:** Surface water crossings with pipe above the water shall be adequately supported by pipe support piers or steel girders as shown on Standard Details 536.03, 536.04, and 536.06. Neoprene Rubber shall be placed between pipe and all points of contact with concrete and stainless steel straps. Disturbed banks are to be stabilized with rip rap placed over a non-woven fabric.
- 12) **Crossing Conflicts:** All drains, gutters, culverts, and sewers for surface drainage are to be kept open. If unavoidable, Interruptions shall be coordinated with the jurisdiction having authority. They shall approve the plans to interrupt service.

B. DUCTILE IRON PIPE

1) **Construction:**

Gravity DIP shall conform to the same foundation and backfill requirements as those prescribed for water mains. Minimum laying length shall be 18 feet except for Tee/Wye connections or tie-in at a structure. However, bury limitations shall be governed by Table 02275.1.

2) **Mechanical Joint Bolt Torque:**

Where mechanical joint fittings are required, unless otherwise advised by the manufacturer, the minimum bolt torque shall comply with Table 2 of AWWA C600 for mechanical joints, as follows:

Bolt Size (Inches)	Torque (Ft-Lbs)
5/8	45-60
3/4	75-90
1	100-120
1 3/4	120-150

- 3) See also Section 02275 – Trenching, Backfilling, and Compaction of Utilities.
- 4) Minimum cover shall not be less than 3 feet. IF 36" CANNOT BE OBTAINED AT FINAL GRADE THAN 15A NCAC 2T .0305 (g) (4) SHALL APPLY.

C. STEEL PIPE

1) **Aerial Pipe**

- a. Where required, steel aerial pipe shall meet the length, thickness, and diameter shown on the plans.
- b. Pipe is to be joined by welding. The pipe shall be beveled and prepared for field welding at the circumferential joints. Joining of steel pipe shall meet the requirements of AWWA C206.
- c. Pipe support piers shall be constructed in accordance with Standard Detail 536.03, as applicable. Upon completion of installation, paint the exterior of the pipe with coal-tar enamel. See Section 2.1.C of this specification.

2) **Encasement Pipe**

Where required, steel encasement pipe shall meet the length as shown on the plans and the thickness and diameter as shown on Standard Detail 517.01 OR AS DIRECTED BY THE ENGINEER OF RECORD WHICHEVER IS MORE STRINGENT.

Construction shall be executed in such a manner as to prevent settlement of the ground surface above the pipeline. The installation of the pipeline shall follow the heading or tunneling excavation as closely as possible.

Installation shall be in accordance with AWWA.

The pipe shall be beveled and prepared for field welding at the circumferential joints. Joining of steel casing pipe shall meet the requirements of AWWAC206. Casing shall be installed by dry boring and jacking or open cut, as indicated on the drawings.

Encasement ends shall be enclosed as shown on Standard Detail 517.01.

Manufactured Spiders: Refer to Standard Detail 517.01 for spider spacing.

All carrier piping shall be restrained joint.

D. PVC PIPE

PVC pipe shall be installed in accordance with Section 02275 and all manufacturers' recommendations.

3.2 TUNNELING METHOD

A. GENERAL

All liner plates and ribs used in the tunnel shall be of one type.

All operations of the Contractor shall be subordinate to the free and unobstructed use of the rights of way for passage of traffic without delay or danger to life, equipment, or property. The Contractor shall provide all necessary bracing, bulkheads, and shields

to ensure safety to traffic at all times. The Contractor shall provide all traffic control devices as necessary and as shown on the approved traffic control plan.

B. TUNNELING (BORING METHOD)

Commence boring operation from a pit, with the bottom excavated to grade, and sheeted or shored if necessary. A steel pipe shall be jacked in place as a casing pipe. Boring through rock shall be oversized to allow installation of carrier pipe but no casing pipe shall be required unless liner plate is necessary for safety reasons.

C. TUNNELING (HAND MINING)

- 1) Commence tunneling operation from a pit, with the bottom excavated to grade, and sheeted or shored if necessary.
- 2) Install the steel liner plates immediately after the excavated material has been removed and remove the material not more than 24 inches ahead of the installed liner plates.
- 3) Grout all voids between the soil and tunnel liner plates. The maximum grouting pressure shall be 30 psi. Start grouting at the bottom of the tunnel liner plates and proceed upward progressively and simultaneously on both sides of the tunnel. Install liner plates no more than 6 feet ahead of grout section. Prohibit traffic over ungrouted sections of tunnel unless this section is in solid rock. Thoroughly dry-mix grout ingredients before adding water. After adding water, mix the batch for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. Placing shall be quick and continuous. Placement shall be under pressure with a grout pump. The period between installation of the tunnel liner plate and the placing of grout shall not exceed 7 hours, without the approval of OWASA's Engineer. Upon completion of grouting, fill grout plugs with provided grout hole plugs.
- 4) Smoothly pave the bottom of the tunnel with concrete. After installation of the tunnel liner plates, the Contractor shall pour concrete pavement on the bottom quadrant (invert) of the tunnel, the surface of the pavement being parallel to the inner plate, with screed rails embedded in it, on line and grade for the installation of pipe in the tunnel.
- 5) The periphery of the tunnel shall be trimmed smooth to fit the outside of the steel liner plate as nearly as is practical, so that the void outside the plates is a minimum.
- 6) After installation of the tunnel liner, pull the carrier pipe in place a joint at a time. Each joint of the carrier pipe shall be supported by spiders strapped to the carrier pipe.
- 7) Close up tunnel liner ends to protect against entrance or foreign matter. The open ends of the casing pipe or tunnel shall be closed off by an 8-inch grout or masonry block wall prior to backfilling. A steel drain line to a 1 cubic yard French drain or to daylight shall be provided.

- 8) If installation is under railway tracks, all permits shall be obtained and Railway Company shall be notified prior to such installation. The same shall apply to contacting the applicable Municipality or NCDOT if installation is under a roadway.

3.3 MANHOLE CONSTRUCTION

A. STANDARD MANHOLES

- 1) Manholes shall be constructed in accordance with Standard Details 532.01 and 532.02. The Contractor shall exercise care in the ordering of manholes so that the use of grade rings for leveling and adjustments can be minimized. "O" Ring or Ram Neck shall be used along with Infi-Shield® Gator Wrap external sealing systems, as manufactured by Sealing Systems, Inc., are to be placed on the exterior joints of manholes. Infi-Shield® Uniband shall be placed at the top of manholes where the iron casting mates with the precast concrete cone section and/or grade rings. See Standard Details 532.01, 532.08, and 532.09.

Non-shrink grout shall be placed around pipe where pipe meets invert in manhole to provide for a smooth transition for sewage flow.

Manholes shall be installed plumb.

When applicable, during installation of manhole, if frame and cover is near or within wheel path in roadway, turn cone to place out of wheel path.

- 2) In general, **inverts** shall be poured and shaped on site. Precast manholes where the inverts are included in a monolithic pour are permitted, however, no field adjustment or additional shaping shall be made to preformed inverts to address deviations during installation.
- 3) **Flow Channel:** The flow channel straight through the manhole shall be made to conform as closely as possible in shape and slope to that of the connecting sewers. The channel walls shall be formed or shaped to one full diameter width and three-quarters (3/4) of the height of the crown of the outlet sewer in such a manner to not obstruct maintenance, inspection, or flow in the sewers. When inlet pipes are above the invert, the invert shall be shaped up toward the inlet pipe to keep material from depositing. When curved flow channels are specified in manholes, including branch inlets, minimum slopes should be increased to maintain acceptable velocities. See Standard Details 532.01 and 532.02.
- 4) **Bench:** A bench shall be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench shall be sloped no less than ½ inch per foot (4%). The invert elevation of any lateral sewer, service connection, or drop manhole pipe shall be above the bench surface elevation. No invert shall be located directly on the surface of the bench. See Standard Detail 532.02.

B. DROP MANHOLES

Invert elevations for drop connections in manhole shall be as shown on the plans. ALL INVERTS 18" OR MORE SHALL BE CONSTRUCTED AS AN OUTSIDE DROP.

OWASA may require an outside drop if necessary to prevent excessive sewer main depth.

Exterior drop connections shall consist of DIP and mechanical joint fittings. Exterior drop manholes shall be installed per Standard Detail 532.03. Manholes shall conform to PART 2 - PRODUCTS.

Interior drops are not permitted.

C. FLEXIBLE PIPE-TO-MANHOLE CONNECTOR

When it is necessary to field core a manhole and install a flexible Pipe-to-Manhole connector. This applies to Brick/Block and precast concrete sanitary sewer manholes; the connector shall be installed per the manufacturer's recommendations.

D. PRECAST CONCRETE DOGHOUSE MANHOLES

When it is necessary to install a manhole over an existing sewer main, a precast concrete doghouse manhole shall be installed over the main. A concrete base shall be poured and the doghouse manhole set over the existing sewer. The joint between the precast manhole and the base shall be sealed both inside and out with grout. The annular space of the precast manhole, around the main, shall be filled with grout and a shelf formed to the springline of the existing main. The crown/top of the main shall be removed once the shelf has been formed and has set sufficiently. See Standard Detail 532.08.

E. INSTALLATION OF MANHOLE FRAMES AND COVERS

Frames and covers shall be installed to manhole in accordance with Standard Details 532.01 and 532.06, as applicable. Frame and covers shall be installed to finished elevation. Adjustments shall be made as necessary to achieve finished elevation. On all manholes, ½-inch grout is to be placed between the frame and concrete casting or grade adjustment ring.

F. GRADE RINGS/ADJUSTMENTS

In street rehabilitation work, the combination of grade rings and/or brick shall not exceed 12 VERTICAL INCHES before removal of the cone is necessary to effect adjustment. When making adjustments to manhole frames, place a ½-inch parge coat on interior of manhole from half depth of the iron casting to a depth of 2 inches below the top of the precast cone. See Standard Detail 532.06.

G. REPLACEMENT/REHABILITATION OF EXISTING MANHOLES

Replacement of Manholes: OWASA reserves the right to require replacement of the existing manhole with a new manhole. OWASA will provide the manhole but the Contractor shall pick up and install it. When a new manhole is necessary, the old manhole must be completely removed and a new precast manhole constructed in its place.

Any tie-in's performed on sanitary sewer manholes must be machine-core drilled with a neoprene flexible boot and adjustable band, except brick manholes. The core shall be the size specified with a smooth finish. If connecting to existing brick manhole, seal

penetration WITH HYDRAULIC CEMENT on perimeter of manhole. Coordinate with OWASA's Engineer.

H. TESTING OF MANHOLES

All Manholes are to be subjected to a vacuum test. This includes all doghouse and rehabbed manholes. Manholes shall be vacuum tested after construction in accordance with the manhole vacuum testing procedures outlined in Section 3.9, paragraph B, item 6. Service connections tied into manholes shall be tested in conjunction with the manhole.

3.4 ABANDONING SEWER LINES AND MANHOLES

A. SEWER LINES

The following sewer pipes shall be abandoned by removal or by filling with grout / flowable fill concrete (50 psi minimum/ 150 psi maximum) in accordance with the following criteria (see Standard Detail 536.05):

- 1) Pipes larger than 24-inches diameter
- 2) Pipes located within roadway section and meeting one of the following conditions:
 - a. pipes that are 12-inches diameter up to and including pipes that are 24-inches diameter and are buried less than 20 feet below finished grade
 - b. pipes that are 6-inches diameter up to 12-inches diameter that are not cast iron, ductile iron, PVC, or HDPE and are buried less than 12 feet below finished grade
- 3) Pipes located below groundwater table that could become a conduit for water movement

Optionally, sewer pipe may be excavated and removed subject to Engineers approval and approval of controlling Right-of-Way agency.

B. MANHOLES

When an existing manhole, either partially or wholly, is designated to be abandoned and the sewer lines, either entering or exiting the manhole, have been abandoned according to the preceding paragraph, the upper portion of the manhole is to be removed to within 36 inches of the proposed finished grade, or as determined by OWASA's Engineer, #57 stone dumped into the manhole, the stone vibrated to consolidate the stone. The remainder of void or space between the top of the manhole and the finished subgrade is to be backfilled as follows. Backfill with #57 stone and consolidate. Outside roadway right of ways, filter fabric shall be placed over the stone and suitable material of a compactable nature shall be placed over the concrete manhole pad (see Standard Detail 536.05) and tamped.

I. SERVICES

Prior to abandonment of a sewer service connection, as directed by OWASA, the contractor shall be responsible for televising the sewer main where the service is to

be abandoned, and providing CCTV video footage to OWASA. The OWASA Inspector shall determine the nature of the permanent repair required for the abandonment by considering the sewer main material, the nature of the connection to the main, and the condition of the main. The abandonment shall be witnessed by the OWASA Inspector.

3.5 BYPASS PUMPING

Contractor is required to furnish all materials, equipment, labor, power, and maintenance, etc. to affect a temporary pumping system for the purpose of diverting the existing flow around the work area. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility.

A. LONG-TERM BYPASS PUMPING (GREATER THAN 24-HOUR DURATION)

This section addresses bypass pumping arrangements of greater than 24-hours duration.

- 1) Bypass pumping arrangements shall consist of two pumps of equal size at the diversion manhole. Each of the bypass pumps; that is, the primary and secondary (redundant) pumps, shall be sized to:
 - a. Accommodate maximum flow possible through the approaching pipeline entering the manhole where the pump suction piping will be installed. This volume of flow shall be based upon full circular pipe flow. The minimum design criteria slope for the size pipe being replaced shall be used for calculation, including the appropriate roughness coefficient for the pipe material; and,
 - b. Pump continuously without disruption or suspension of flow to the discharge manhole. This requires that each pump be designed taking into consideration the total dynamic head conditions of the pump system including discharge piping and fittings.
 - c. The pump size for the redundant pump shall be the same as the primary pump. The redundant equipment shall be staged and configured in a fashion so that the redundant pump operates automatically in the event of a failure of the primary system. The primary pump will be capable of handling the flow completely without assistance from the secondary pump.
- 2) Contractor shall provide the necessary labor and supervision to set up and operate the pumping and bypassing system. Contractor shall comply with local Town sound ordinance. If pumping is required between the hours of 8:00 PM and 6:00 AM, engines shall be equipped as specified in item 6) below in order to keep noise to a minimum.
- 3) Overflows from bypass operations will not be permitted to enter into any streams or bodies of water. The Contractor will be solely responsible for any legal actions taken by the state regulatory agencies if such overflows occur.
- 4) Bypass pumping equipment shall include pumps, conduits, engines, and related equipment necessary to divert the flow or sewage around the section in which work is to be performed. In addition, the Contractor shall maintain at the same location and in operable condition, duplicate equipment to be used in case there is equipment failure. In the event of failure of any component of the primary or

secondary system, the Contractor shall promptly repair or replace the failed equipment to the satisfaction of OWASA's Engineer.

- 5) The contractor shall remain onsite during inspection and testing of the bypass system by the contractor for a minimum of 24 hours of trouble-free bypass during testing, regardless of the approval to use an autodialer for the actual bypass operation. The new sewer line may be used by the Contractor to carry the sanitary flows after the new pipe has passed inspection and testing. Any "temporary" connections to the new sewer line shall be approved by OWASA's Engineer.
- 6) Engine driven equipment for primary bypass pumping equipment shall have "critical grade mufflers." If equipment is operated between the hours of 8:00 PM and 6:00 AM, this equipment shall also be provided with sound attenuation enclosure. It is not necessary that the secondary (redundant) pump meet these requirements. The enclosure shall be portable in order to allow the enclosure to be moved when bypass pumping equipment is moved. These conditions are subject to any other additional stipulations that may be required by local Town sound ordinances.
- 7) Security fencing or other means shall be provided around manholes and pumping equipment to protect the manhole from accidental or unauthorized entry and tampering with the bypass equipment.
- 8) Continuous (24 hours/day) monitoring is required for all bypass pumping operations. "Continuous monitoring" in this instance shall be documented at least hourly on log sheets and submitted daily to the Owner or owner's representative, with copy to OWASA. Continuous manning of the operation by an individual that is trained and able to respond in the event of equipment failure is preferred. In those cases where OWASA determines that continuous manning is not feasible/required then arrangements will be made to continuously monitor the operations remotely. This remote monitoring will require that maintenance/repair personnel can be notified and respond on site within 45 minutes. OWASA and the responsible owner will be immediately contacted by telephone anytime an overflow condition may occur. In addition, the contractor shall visit every bypass daily, including weekends and holidays, for visual inspection and document the visit on the log sheets. OWASA may require continuous monitoring during major storms.
- 9) The Contractor shall submit to OWASA a detailed plan and description outlining all provisions and precautions to be taken by the Contractor regarding handling of existing wastewater flows. This plan must be specific and complete, including flow calculations, pump sizing calculations, method of continuous monitoring of pumps (telemetry or manned), schedule for entire duration of bypass pumping operations, contact name and telephone numbers of responsible personnel. No bypass pumping shall begin until all requirements have been reviewed and approved by OWASA.
- 10) The plan shall be sealed by a Professional Engineer licensed in North Carolina, and include but not be limited to the details of the following:
 - a. Staging areas for the pumps.
 - b. Sewer plug method and type of plugs or gates to be used.
 - c. Number, size, material, locations, and method of installation of suction piping.

- d. Bypass pump sizes, capacity, number of each size to be on site, and power requirements.
 - e. Calculations of static lift, friction loss, and flow velocity
 - f. Stand-by power.
 - g. Downstream discharge plan.
 - h. Method of noise control for each pump.
 - i. Temporary pipe supports and anchoring required.
 - j. Heavy equipment needed for installation of pumps and piping.
 - k. Stand-by/back-up pumpset for the bypass application.
 - l. Fueling of pumpsets on demand.
 - m. **Alarm systems:** An alarm system designed to alert of bypass pumping system failures shall be included. Alarms shall be included for high water and activation of the secondary pump, as well as the loss of power to a pump. The proper functioning of an alarm shall not be dependent on the power for the pump served.
 - n. **Stormwater Outfalls:** Analysis of the outfall locations for any stormwater inlets which would receive water from an overflow, their outfall location to the environment, and maps identifying the inlet and outfall locations.
- 11) **Testing and Call Sequence.** Prior to beginning of any and all sewer bypass pumping operations, a complete and through trial run-thru of the operation of the **pumps and equipment** and functionality of the autodialer with OWASA's Point of Contact (POC) shall be conducted. Typically, the POC will refer to either a Construction Inspector (System Development projects) or Project Manager (for CIP projects). The bypass provider (manufacturer/provider) and utility contractor must be present during this event. This test must mimic a sewer overflow condition and all phone numbers programmed into autodialer must be contacted in sequence. Any prerecorded message must be approved in advance by OWASA and must include the project name and location of the reporting bypass as well as the OWASA POC assigned to the project.

Generally, the **sequence of calls** shall follow the protocol below:

1. Pump Supplier
2. *Superintendent for Utility Contractor
3. Project Manager for General Contractor
4. OWASA Inspector
5. Water Treatment Plant Operator
6. Owner Representative

*Note: Superintendent for Utility Contractor will immediately call OWASA POC to advise of situation.

- 12) Bypass pump documentation manufacturer's "cut sheet" or specification along with the pump curve shall be posted at the location of each pump. This shall be covered/protected so that it is legible and easily accessible to OWASA personnel at all times.
- 13) Contractor shall be responsible for providing any and all protection of the entire pumping system against freezing temperatures. The Contractor shall be responsible and pay all civil penalties, fines, costs, assessments, etc., associated

with any discharge of raw or inadequately treated wastewater due resulting from inadequate freeze protection of any and all parts of the pumping system.

- 14) Contractor shall have adequate bypass piping system replacement and repair parts and supplies located and immediately available to him on the jobsite. The OWASA representative shall review and approve the adequacy of the replacement and repair parts and supplies on the jobsite prior to initiation of any sewer bypass operations.
- 15) In the event of any sewer overflow or spill where active cleanup operations must commence, OWASA shall immediately become the incident commander. All those present in response to the emergency shall follow the directive of the OWASA incident commander. This incident commander shall be the Distribution and Collections Manager or assistant manager or OWASA POC. **Contractor shall provide spill containment in areas where fuel or sewage may otherwise reach the ground.**
- 16) In the event that there is a sanitary sewer overflow of any volume, the contractor shall immediately notify both the OWASA Inspector assigned for the project and OWASA's Distribution and Collection Systems Manager and provide any and all requested information regarding the overflow. The Contractor shall be responsible and pay all civil penalties, fines, costs, assessments, etc., associated with any discharge of raw or inadequately treated wastewater associated with the Contractor's bypass pumping operations.
- 17) Once a bypass operation is underway, the contractor shall perform periodic testing of the entire backup system, equivalent to the initial testing done prior to implementing the bypass. These checks shall include turning off the main pumps and seeing the secondary system function as expected, as well as the testing of all alarms. The duration of each check shall be sufficient to fully assess the system and recharge backup batteries. The testing shall occur on a weekly schedule, unless otherwise approved by OWASA.

B. SHORT-TERM BYPASS PUMPING (24 HOURS OR LESS)

Bypass Operations for periods of 24 hours or less may be sized on the expected peak flows during this period or, if applicable, the 10-year storm frequency event. In all cases, of bypass operations of 24 hours or less, the contractor shall provide for a qualified and competent attendant who shall be onsite at all times during this period. Any bypass pumping arrangements for 24 hours or less must be approved in advance by OWASA personnel and shall be on a case-by-case basis. Contractor must have an equivalent or larger sized redundant pump onsite and in good working condition. This pump must be available and ready to install immediately should the primary pump fail. Requirement for noise attenuation will also be considered on a case-by-case basis but may be subject to local governing jurisdictions' ordinances and must be approved by those entities. **Requirements for fencing will be determined by OWASA on a case-by-case basis.**

3.6 SERVICE CONNECTIONS

A. NEW SERVICES

Unless otherwise permitted by OWASA's Engineer, all sewer services and cleanout stacks between the OWASA main and the edge of easement or road right-of-way shall be either Class 350 DIP slip joint pipe with mechanical joint fittings or AWWA C900 DR 20 Pressure Class 200 psi with AWWA C900 PVC DR 21, Pressure Class 200 psi gasketed fittings. See Standard Detail 534.01.

B. BORED SERVICES

Where laterals are bored, the face of the bore cut shall be a minimum distance of five feet from the edge of the pavement on either side unless OWASA's Engineer gives approval to the contrary.

C. SEWER LATERAL

The minimum diameter for a sewer lateral is 4 inches, and is typically 4 or 6 inches in diameter. 4-inch sewer laterals shall be connected to the main by means of an in-line monolithic wye or, if on an existing line, with a tap and saddle installed over a hole cut in the top quadrant of the main at an angle of forty-five degrees (see Standard Detail 534.01), with respect to flow direction. The hole shall be cut with a mechanical circular type saw cutter designed for the particular use and rendering a smooth uniform cut with no damage to the main and is one which retrieves the plug.

D. WYE AT PROPERTY LINE CLEANOUT

A wye is to be provided at the cleanout set at the property line. All laterals are to be left exposed until the inspectors can verify the installation of each service.

E. NO VERTICAL STACKS OR STANDPIPE SERVICES

Vertical stacks or standpipe services are not allowed.

F. LOCATION OF CLEANOUT

The first cleanout upstream of the main shall be located at the public road right-of-way or sewer easement boundary, straddling the easement boundary. Where no right-of-way or easement exists, the cleanout shall be located a minimum of 15 feet from the main. A cleanout box and lid shall be set over the cleanout. The cleanout is to be set between 4 and 6-inches from the top of the box.

G. GRADE

Minimum grade for services shall be ¼-inch per foot for 4-inch services. Minimum grade for 6-inch services are to be laid preferably at a 1/8-inch per foot, but no less than 0.6%.

H. SERVICE SADDLES

Service saddles shall be constructed using Romac Industries, Inc. sewer service saddles or approved equal, placed in the top quadrant of the pipe main. Backfill under and around saddle with #67 stone. See Standard Detail 534.01.

I. MAINTENANCE OF SERVICE

During service installation or line rehabilitation on existing mains, the Contractor shall be responsible for the maintenance of all sewer house connections and the proper treatment and/or by-pass of effluent sewer around work areas.

J. CONTRACTOR RESPONSIBLE FOR CAUSED DAMAGE

Any services or utilities damaged by the Contractor shall be properly repaired.

K. AIR TESTING NEW SERVICES

Sewer lines shall be **air tested** (low-pressure air test) after the complete installation of all sewer services. Laterals shall be tested with the main line. THIS APPLIES TO NEW SEWER SERVICES INSTALLED.

L. CONNECTION TO MAIN IN EASEMENT OR RIGHT OF WAY

Sewer laterals connect to the public sewer main in the public road right-of-way or within a sewer easement that has been dedicated and conveyed to OWASA.

3.7 CONCRETE ENCASEMENTS

All concrete encasements shown on the plans shall be constructed per the details on the plans.

The earth may be used for side and bottom forms provided such sides can be excavated uniformly smooth and to the size and shape specified. Care must be taken during the pouring operation to ensure that the pipe does not float or move from the buoyant effects of the concrete. Misalignments of the crossings shall be cause for total removal and replacement of the encasement by the Contractor.

Once the concrete is set, measures shall be taken to cure the concrete by covering it with plastic. Water shall not be allowed to run over the concrete for at least 48 hours.

Forms will be required if the subgrade and sides are not firm or will not hold shape.

Exercise care to avoid spilling concrete into creek.

3.8 USE OF SLOPE ANCHORS ON STEEP LINES

All lines with slopes from 15 to 20 percent shall have concrete anchors placed on the bell end of the sewer line. The anchors shall be spaced AS OUTLINED IN 15A NCAC 02T REGULATIONS, the **NCDWR Minimum Design Criteria for the permitting of Gravity Sewers**, OR as shown on the plans (WHICHEVER IS MOST STRINGENT) and

constructed to the dimensions shown on Standard Detail 536.01. Anchors shall penetrate at least 6 inches into virgin soil. Concrete shall be 4000 psi concrete.

3.9 TESTING

A. TESTS BY PIPE MATERIAL

The following tests shall apply for the respective pipe materials as required by the following specifications.

Table 02530.2				
Table of Testing Applications				
Material	Air Test	Vacuum Test	TV Inspection (OWASA may require VISUAL INSPECTION ON a case-by-case basis)	Mandrel Pull
DIP	X		X	
PVC	X		X	X
Manholes		X		

B. TEST AND INSPECTION

All sanitary sewer pipe shall be tested after backfilling has been completed and before final acceptance by OWASA. Upon completion of entire pipe installation, OWASA's Engineer shall inspect the work in part or as a whole and make such tests as necessary to verify that the work has been carried out in accordance with the plans and specifications.

All manholes shall be of the specified size, shape, and material, and shall have their tops set to the grade as furnished by the Design Engineer.

The Contractor shall provide all equipment, material, water, labor, etc. needed to perform any and all tests in accordance with the procedures listed herein. All equipment, materials, etc. used shall be checked and approved by OWASA's Engineer prior to its use. It shall be the responsibility of the Contractor to ensure pipe to be tested is clean before any tests are made. Frame and covers shall be tested with manhole tests.

Test for leakage of gravity sewers shall be done as directed by OWASA's Engineer or as shown on the plans.

- 1) **General Requirements:** Testing and inspection shall promptly follow installation of wastewater pipe including services. Testing shall not be more than 1000 feet behind sewer pipe laying operation.

Furnish all pumps, gauges, instruments, test equipment and personnel required for inspections and testing operations.

Provide lights and mirrors and inspect lines in presence of OWASA's authorized representative.

All final testing and inspections shall be performed in the presence of the OWASA's Engineer.

Flush all sand, dirt and debris from lines prior to inspection.

Clean and pretest prior to notifying the OWASA's Engineer and arranging for inspections and tests. FAILURE TO CLEAN AND PRE-TEST MAY RESULT IN RE-INSPECTION FEES.

Inspect the system for conformance with line and grade shown on the plans and provide record drawing measurements CERTIFIED BY PLS AND ENGINEER OF RECORD on Record Drawings. THESE MEASUREMENTS SHALL BE TIED TO NC PLANE COORDINATES in 88/83 datum.

- 2) **Flushing:** If during any of the inspections sewer lines and manholes are found to contain mud and other debris, the Contractor shall be required to flush or clean this material from the system by whatever means necessary. Mud and other debris shall not be allowed to enter the existing sanitary sewer system. The Contractor shall be responsible for the cost of water used to flush the system AND PAY A RE-INSPECTION FEE
- 3) **Backfill Testing:** Testing of backfill shall be performed in accordance with the requirements of Section 02275 – *Trenching, Backfilling, and Compaction of Utilities*.
- 4) **Visual Inspection:** Visual inspections may be required by OWASA on a case-by-case basis. When required, sewer lines shall be visually inspected from every manhole by use of mirrors. The lines shall exhibit a fully circular pattern when viewed from one manhole to the next. Lines, which do not exhibit a true line and grade, have obstruction or structural defects, shall be corrected to meet these specifications and the sewer barrel left clean for its entire length.
- 5) **Primary test method – Low Pressure Air Test:** Sewer lines shall be **air tested** after the complete installation of all sewer services. Sewer laterals are to be tested along with main. The Contractor shall be responsible for furnishing all equipment and labor for the low pressure air test at no additional cost to OWASA.

The portion of the line being tested shall be accepted if the portion under the test meets or exceeds the requirements of ASTM F1417. This requirement shall be accomplished by performing the test as follows: the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig greater than the average back pressure of any groundwater that may be over the pipe shall not be less than the time shown for the given diameters in Table I *Line Pressure Air Test Table*. If the system does not meet the foregoing requirements, the Contractor will be required to locate and repair the leaks at no cost to OWASA and repeat the tests until the allowable leakage is obtained.

Procedure:

a. Prerequisites

- i. It is imperative that proper plugs be installed on the laterals at the cleanout stack. All plugs should be properly installed to withstand the test pressures without requiring external bracing or blocking. Before tests are made, all wyes, tees, or end of side sewer stubs shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal

test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or extension.

- ii. Air leakage testing of installed system shall be performed with a continuous monitoring gauge no less than 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of plus or minus 0.04 psi. All air used shall pass through a single, above ground control panel visible to the OWASA's Engineer.
- iii. Individual air hoses shall be used from control panel to pneumatic plugs, from control panel to sealed line for introducing low pressure air, and from sealed line to control panel for continually monitoring the air pressure rise in the sealed line. After all pipes are cleaned, air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 psig (greater than average groundwater backpressure that may submerge the pipe). Throttle the air supply to maintain that constant pressure for at least 2 minutes. The air pressure supply shall then be disconnected from the system or shut-off. Do not enter manhole during test. Do not exceed 9.0 psig in the system.

b. Conducting the Test

- i. Observe the continuous monitoring gauge while decreasing the pressure to no less than 3.5 psig (greater than groundwater pressure). At a reading of 3.5 (adjusted), or any convenient observed pressure reading between 3.5 and 4.0 psig (adjusted), timing shall commence with a stopwatch or other timing device that is at least 99.8% accurate. Regulate the pressure for at least 2 minutes to permit the air/ground temperature to reach equilibrium before commencing test.
- ii. Measure the time interval for pressure to drop 1.0 psig.
- iii. If the time, shown in Table I for the designated line size and length, elapses before the air pressure drops 1.0 psig, the section undergoing the test may be discontinued once the prescribed time has elapsed even though the 1.0-psig drop has not occurred. Record all readings.
- iv. If the pressure drops 1.0 psig before the appropriate time shown in Table I has elapsed, the air loss rate shall be considered excessive, and the section of pipe has failed the test. Record all readings.
- v. If service lateral sewers are included in the test section, their lengths may be ignored for computing the required test times. The test will be slightly more severe. In the event a test section, having a total surface area less than 625 square feet, fails to pass the air test when lateral sewers have been ignored, the test time shall be recomputed to include all lateral.

TABLE I
Line Pressure Air Test Using Low-Pressure Air
SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015
 (Excerpted from ASTM F1417)

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length For Minimum Time (ft.)	4 Time For Longer Length (sec.)	Specification Time for Length (L) Shown (min:sec)							
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33

c. After a Failing Test

- i. If the sections fail the air test, the Contractor shall determine the source or sources of leakage and shall repair or replace all defective material and workmanship.
- ii. No sealant shall be used in the newly installed sewers to correct the leaks.
- iii. The extent and type of repair that may be allowed shall be subject to the approval of OWASA's Engineer.
- iv. The repaired pipe installation shall be retested and required to meet the requirements of this test.

d. Safety Note

The air pressure test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. A force of 250 lbs is exerted on an 8-inch plug by an internal pressure of 5 psi. It should therefore be realized that sudden expulsion of a poorly installed plug, or a plug that is partially deflated before the pressure is released, can be dangerous. As a safety precaution, pressurizing equipment should include a pressure regulator set at, for example, 5 psi to avoid over-pressurizing and damaging an otherwise acceptable line. **No one shall be permitted in the manholes during testing.**

6) Manhole Vacuum Testing**a. Prerequisites**

- i. Manholes shall be vacuum tested as indicated below unless otherwise allowed by OWASA's Engineer. Vacuum testing shall meet ASTM C1244. Only new manholes are to be vacuum tested. Vacuum testing of existing manholes is not required.
- ii. The test shall be made using an inflatable compression band, vacuum pump, and appurtenances specifically designed for vacuum testing manholes. Equipment to be manufactured by Peter A Glazier & Associates, Worcester, MA or approved equal. The Contractor shall be responsible for furnishing all equipment and labor for the vacuum test at no additional cost to OWASA.
- iii. Manholes may be tested by vacuum test immediately after assembly of the manhole, frames and connecting pipes, and before any backfill is placed around the manholes. However, the final test and acceptance shall be based only upon a test after the manhole is backfilled and the cover frame castings are grouted in place. Testing devices shall be installed on the iron manhole frame.
- iv. All lift holes shall be plugged with nonshrink grout and all pipes shall be plugged, taking care to securely brace the plugs and pipe. Stubouts,

manhole boots, and pipe plugs shall be secured to prevent movement while the vacuum is drawn.

b. Conducting the Test

- i. Manholes shall be tested from the top of the casting, including the casting-to-cone joint (adjusting ring).
- ii. Installation and operation of vacuum equipment and indicating devices shall be in accordance with manufacturer's recommendations.
- iii. After the testing equipment is in place, a measured vacuum of 10 inches of mercury (Hg) shall be established in the manhole. The time for the vacuum to drop to 9 inches of mercury shall be recorded.
- iv. Acceptance standards for leakage shall be established from the elapsed time for a negative pressure change from 10 inches to 9 inches of mercury. See Table II, *Vacuum Test Table for Manholes*.
- v. If a manhole joint mastic material is completely pulled out during the vacuum test, the manhole shall be disassembled and the mastic replaced.

c. After a Failing Test

If the manhole fails the test, the Contractor shall locate the leakage, make the proper repairs, and the vacuum test shall be repeated until the manhole passes the test. After the manholes have been backfilled and the cover frame casting sealed in place, and prior to final acceptance of the project, any signs of leaks or weeping visible from the inside of the manhole shall be repaired and the manhole made watertight and tested. The extent and type of repairs that may be allowed shall be subject to the approval of OWASA's Engineer. Leaks shall be repaired on the outside of the manhole unless approved otherwise by OWASA.

7) Televising of Sanitary Sewers

CCTV inspections ARE required by OWASA ON EACH NEW SEWER MAIN INSTALLED. Following placement and compaction of backfill and completion of other required testing, but prior to placing of pavement, the Contractor shall televise all sewer lines for conformance to the project drawings and specifications. The sewer main shall be cleaned prior to the TV inspection. A tape and log of the televising **and a report of deficiencies as identified by a NASSCO-certified individual** shall be delivered to OWASA's Engineer within a week of televising. If defective pipe or conditions are discovered, they shall be corrected at no cost to OWASA.

The television camera used for the inspection shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing picture quality IN COLOR to the satisfaction of the OWASA's Engineer.

The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line.

OWASA WILL televise sewer lines prior to the expiration of the one-year warranty. If a defective condition is found, it shall be, COMPARED TO THE ORIGINAL VIDEO. IF EVIDENCE OF NO DEFECT IS FOUND IN ORIGINAL VIDEO THEN IT WILL BE presumed to be caused by defective workmanship or materials. The Contractor shall be notified and shall correct the work in a manner approved by OWASA's Engineer.

8) **Deflection Testing of Sewer Pipes**

- a. Deflection tests shall be performed on all pipe installations. The test shall be conducted after the final backfill has been in place at least 30 days to permit stabilization of the soil-pipe system. As an alternative to waiting 30 days to permit stabilization of the soil-pipe system, with prior approval, OWASA may accept certification from a soil testing firm verifying that the backfill of the trench has been compacted to at least 95% maximum density.
- b. **PVC Sewer Pipe Mandrel Test:** For PVC pipe, perform vertical ring deflection of all semi-rigid and flexible sewer pipe 8 inches or larger after backfilling has been in place for at least 30 days but not longer than 12 months. Deflection shall not exceed 5% (95% of the ASTM D3034 base inside diameter). Testing shall be conducted in the presence of OWASA's authorized representative and shall utilize a mandrel go, no-go gauge complete with proving ring. Mandrel shall be approved by OWASA for this test.
 - i. The mandrel device shall be cylindrical in shape and constructed with a minimum of nine evenly spaced arms or prongs. Mandrels with fewer than nine arms will not be approved for use. The "D" mandrel dimension shall carry a tolerance of plus or minus 0.01 inch. Allowance for piping wall thickness tolerances or ovality (from heat, shipping, poor production, etc., shall not be deducted from the "D" dimension but shall be counted in as part of the 5% or less deflection allowance.
 - ii. The mandrel shall be hand-pulled by the Contractor in the presence of the OWASA authorized representative. The mandrel must slide freely through the pipe with only a nominal hand force applied. Any sections of the sewer not passing the mandrel shall be uncovered and the Contractor shall re-round or replace the sewer to the satisfaction of OWASA's authorized representative.
 - iii. Contact length shall be measured between points of contact of the mandrel arm.
 - iv. The inspector shall be responsible for approving the mandrel. Proving rings may be used to assist with this. Drawings of the mandrel with complete dimensions shall be furnished by the Contractor to OWASA for each diameter and specification of pipe.

- c. Perform the test without mechanical pulling devices.
- d. Allowable maximum deflection for installed plastic sewer pipe is limited to 5 percent of the original vertical internal diameter.
- e. Perform deflection testing using “Go/No-Go” mandrel.
- f. Measure pipe in compliance with ASTM D2122.
- g. Locate, excavate, replace, and retest pipe exceeding allowable deflection.

9) Force Mains

- a. **Order of Operations:** Fill the system with water at a velocity of approximately 1 foot per second while necessary measures are taken to eliminate all air. Do not leave fill line connected to sewer line unless an RPZ backflow preventer is placed between the potable water supply and the line being filled. AS OUTLINED IN AWWA C651.
- b. **Pressure Tests & Leakage:** The Contractor shall test completed sections of line, including fittings, with water. This testing, however, does not relieve the Contractor of their responsibility to repair or replace any cracked or defective pipe. All work necessary to secure a tight line shall be performed by the Contractor. Testing shall be performed in the presence of OWASA's Engineer and the Contractor. Cost for testing shall be incidental to line construction.

Pressure Test: The newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for two hours to a leakage test. Raise the pressure by pump to 200 psi, 150% of design working pressure, or test pressure as shown on the drawings, whichever is greater. Measure the pressure at the low point on the system compensating for gauge elevation. Maintain this pressure (+ or – 5psi) for 2 hours. If pressure cannot be maintained, determine cause, repair, and repeat the test until successful. The allowable leakage shall be no greater than allowances shown in AWWA C600. An excerpt from this chart is located at the rear of OWASA specification Section 02510 – *Water Distribution*. Contractor shall be responsible for all costs, labor, materials, and equipment to perform the testing. All visible leaks, broken or cracked pipe, valves, etc. shall be repaired.

i. Prerequisites

- a) All pipe has been laid and the trench backfilled.
- b) Valves shall be properly located, operable and at correct elevation.
- c) All reaction anchors have had sufficient set of 7 days. High early strength concrete, 4500 psi or greater, may be used to reduce number of days to 4.
- d) Lines shall be properly vented where entrapped air is a consideration.

- e) All construction activities on the project, that requires trenching or excavation within the limits of the line location, shall be completed prior to pressure testing of line.

3.10 PUMP STATIONS AND FORCE MAINS

A. PUMP STATIONS

Pump stations and force mains will be allowed only with the permission of OWASA's Executive Director. Pump stations shall be either self-priming or submersible pumps and designed in accordance with the requirements of the NC Department of Environmental Quality, Division of Water Resources, NCAC Title 15A 2T, latest revision. Typical Pump station site layout shall conform to Standard Details 539.01 through 539.05. Lift stations shall include the following as a minimum:

- 1) Service head, meter base, service connection, disconnect, and area light with switch.
- 2) Audible and visual high-water alarm and alarm silence. High water alarm circuitry. Provide dual high-water alarm floats. The first (lowest) high water alarm float is to activate the telemetry only (not the alarm and light) to allow maintenance personnel time to arrive at site and attempt to fix the problem. The second (higher) high water alarm float shall activate the alarm horn and light.
- 3) Auto-dialer (minimum 8 numbers, 4 channels). The automatic telephone dialer shall be a solid-state component capable of dialing up to 8 phone numbers, each up to 24 digits in length. The dialer shall have solid state voice message recording and playback, all implemented with permanent nonvolatile solid-state circuitry with no mechanical tape mechanism.
- 4) Automatic air release valves, as applicable.
- 5) For self-priming pumps, provide air bubbler type control system with hand-off-automatic (H-O-A) switches and an automatic alternator. For submersible pumps, provide mercury float switches for level control.
- 6) 3-phase voltage monitor, if applicable. Indication of 3-phase power fail.
- 7) Suction and/or discharge gauges, as applicable.
- 8) Elapsed time indicators.
- 9) High pump temperature protection.
- 10) Pump run lights.
- 11) Motor overload resetter.
- 12) Surge suppressor.
- 13) Duplex service receptacles on GFCI installed external to the NEMA 4X enclosure.
- 14) Surge relief valve and return piping to wetwell.
- 15) Start-up assistance and certification, including operational/witness/drawdown test. Certified pump curves shall be provided as part of the project closeout documents.
- 16) Dual power supply auto switch-over, etc.
- 17) Non-Freeze Yard Hydrant (Clayton Mark model 5451 Lever type frost proof yard hydrant).
- 18) For self-priming pump stations, provide heaters and fluorescent lighting.
- 19) Non-Freeze shower w/ eyewash and concrete pad.
- 20) 10 ft x 10 ft x 8-inch concrete pad for water tank with drain and valve.
- 21) Emergency pump connection w/ blind flange and gate valve.

- 22) The lift station is to include back-up alarm system that operates off a 12-volt battery connection in the event of power failure. The battery system is to include a trickle charger to ensure battery integrity.
- 23) Provide auxiliary propane, natural gas or diesel fired automatically activated stand-by power generator source with automatic reset, placed on site. Pump manufacturer to provide power demand/ratings to Contractor before ordering pump and the power demand appropriately marked on the pump shop drawings. Generator shall have the capacity sufficient to sequentially start and run all pumps in the pump station. The Contractor shall provide a complete engine driven generator set. The generator set shall consist of four-cycle, radiator-cooled, engine direct connected to an alternating current generator, a unit-mounted control panel, all mounted on a common sub-base. The control panel shall be complete with engine controls and instruments, safety controls and panel lights including the following:
- a. The generation unit shall be capable of powering the pump motors starting current, electrical systems, instrumentation/controls and alarm systems, and other auxiliary equipment as may be necessary to provide for the safe and effective operation of the pump station. The generation unit shall have the appropriate power rating to start and continuously operate under all connected loads.
 - b. The generation unit shall be provided with special sequencing controls to delay lead and lag pump starts unless the generating unit has the capacity to start all pumps simultaneously while the auxiliary equipment is operating.
 - c. The generation unit shall be capable of shutting down and activating the audible and visual alarms and telemetry if a damaging operating condition develops.
 - d. The generation unit shall be protected from damage when restoration of power supply occurs.
 - e. The generator shall be equipped with an automatic transfer switch to start generator and transfer load to emergency in case of utility undervoltage, overvoltage, power loss, phase reversal, or phase loss.
 - f. The control panel shall be complete with run-stop-remote switch; remote start-stop terminals; cranking limit; battery charge rate ammeter, oil pressure gauge, temperature gauge; low oil pressure shutdown; high engine temperature shutdown; over speed shutdown; AC voltmeter; voltage adjustment; frequency meter; and running time meter. The controls must indicate engine run, common engine fail, transfer switch position, low fuel level, and fuel tank leak for remote telemetry purposes. The generator shall be equipped with an automatic transfer switch to start generator and transfer load to emergency in case of utility under voltage, over voltage, power loss, phase reversal, or phase loss.
 - g. Circuit breakers shall be provided with a built-in control panel.
 - h. The manufacturer of the unit shall completely assemble and test the unit before shipment. They shall be one who is regularly engaged in the production of such equipment, and who has spare parts and service facilities. They must also provide 1 complete set of filters.
 - i. The controls must indicate engine run, common engine fail, transfer switch position, low fuel level, and fuel tank leak for remote telemetry purposes.
 - j. The automatic transfer switches must have a disconnect on the utility service main side.
 - k. The generator shall comply with the following minimum requirements:

- i. Engine: Four-cycle, 4 cylinder, radiator cooled, at 1800 RPM. Starting shall be from batteries, with capability to start the unit at 32 degrees temperature.
 - ii. Generator: Rating shall be continuous standby service at 0.8 power factor, at 1800 RPM.
 - iii. Voltage: Three-phase, 208. KW rating to match facility needs.
 - iv. Engine shall be equipped with an isochronous governor as manufactured by Woodall.
 - v. Frequency regulation shall be less than 3-cycles from no-load to full load.
- l. All accessories needed for the proper installation of the system shall be furnished. Included should be batteries, battery cables, exhaust piping, mufflers, vibration mounting, and three bound sets of detailed operation and maintenance manuals with parts list. Batteries should be lead acid.
- m. The generator set shall be enclosed with a factory-installed weather-protective housing (sound abating enclosure to 68db @ 23 ft.) Housing shall provide easy access to the engine-generator and instrument panel. Muffler to be designed so exhaust is not blown or sucked across the set by cooling air.
- n. Included with the generator shall be a complete fuel system consisting of a fuel tank, fuel gauge, fuel lines, fuel pumps, valves and any and all other items incidental to a first-quality installation.
- o. Provide integral sub-base double-walled diesel tank. The tank is to be UL approved closed-top dike type. The tank shall also be fitted with a leak sensor device. The tank must have a capacity to run the generator for a minimum of 48 hours at 100% load.
- p. Fuel tank shall consist of the fuel tank separate and contained within the frame. No generator weight is to be supported by the tank. Provide a drain plug at one end of the rupture basin. Provide vibration isolators between generator set and tank assembly. Provide fuel low-level alarm remote mounted.
- q. Provide manufacturer's recommended anti-freeze and engine block heater, per manufacturer's recommendations, with thermostatic controls to maintain engine coolant at proper temperature to fulfill start-up requirements, adjustable if possible. Provide suitable trickle battery charger. All accessories shall be engine-mounted and within the weatherproof sound attenuated housing.
- r. Provide annunciator panels with visual and audible alarms to monitor and warn of emergency operation conditions affecting line and generator power sources.
- s. Provide stainless steel super critical grade type exhaust silencer mounted inside of the generator enclosure for corrosion protection.
- t. Provide amp meter, voltmeter, and frequency meters with phase switches.
- u. Provide fuses or circuit breakers for battery charger and engine.
- v. Provide an automatic battery charger, static type, magnetic amplifier control with DC voltmeter, DC ammeter and potentiometer for voltage adjustment. The charger is to be completely automatic and rated for the type of battery use. The charging rate is to be determined by the state of the battery and reducing to milliamp current on fully charged battery. The charger shall be 120 V., single-phase, 60 cycle, AC input with 6-amp maximum output.
- w. Operation and Maintenance instructions. The Contractor shall provide a minimum of 4 continuous hours of operation and maintenance instructions for the Owner's personnel.
- x. OWASA must be furnished with one complete set of air, oil, and fuel filters.

B. PUMP CERTIFICATION

Contractor to provide a certified shop test of pump from pump manufacturer. Manufacturer's representative shall be present at pump start-up. See paragraph H, *Pump Station Operational/Witness Test/Start-up* requirements, below.

C. WETWELL COATING

Wetwell interiors shall be coated with a two-component elastomeric, hydrophobic, corrosion resistant polyurea coating where the primer can be applied to damp or dry surfaces. Primer coat film thickness shall be 1.5 to 3 mils. The top coat film range shall be from 8 to 12 mils. Shore hardness D shall be minimum 75. Coating shall equal or exceed Duramer K-2002 by Innovative Polymer Solutions, LLC. Contractor to follow all applicable safety measures for handling and application as recommended by the Manufacturer of the coating. Comply with applicable confined space safety requirements.

D. WETWELL/VALVE VAULT HATCHES

Provide access frames and covers meeting Section 2.2.P of this specification with padlocked hasps.

E. FORCE MAINS

Force mains shall be ductile iron pipe. PVC Force mains may be approved by OWASA's Engineer on a case by case basis. Pipe joints may be push on (provided each joint is mechanically restrained), or mechanical joint type with the appropriate restraining gland. All Fittings shall be mechanical joint with appropriate blocking and/or rodding. Force mains shall be constructed in accordance with the plans and in accordance with the requirements applicable to OWASA water main construction.

F. MANUALS/PARTS

OWASA must be furnished with 3 copies of the Operation and Maintenance and Parts Manuals for the pumps/motors and/or station, pump controls, the generator unit, and the automatic transfer switch. Also, provide a spare impeller, key, nut, washer, and mechanical seal for each pump.

G. SAFETY PLACARDS

Provide safety placards as required for structure (e.g. confined access entry) and equipment as required by OSHA shall be posted and readily visible.

H. PUMP STATION OPERATIONAL/WITNESS TEST/START-UP

- 1) **Witnessed Testing:** Witnessed testing shall be performed in the presence of OWASA's Engineer and the results of the testing maintained as part of the construction record documentation. Witnessed testing shall include start-up assistance by a qualified factory representative and certification. Prior to acceptance by OWASA, an operational test of all pumps, drive, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is

safe and in optimum working condition; and conforms to the specified operating characteristics.

- 2) After construction debris and foreign material has been removed from the wetwell, the Contractor shall supply an adequate amount of clear water volume to operate station through several pumping cycles. Observe and record operation of pumps, suction (if applicable) and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration, or other operational problems.
- 3) **Drawdown Test:** The Contractor shall conduct a drawdown test to confirm that the pump is operating at or near the required design operating point and to determine the actual pumping rate of each pump. This test shall be conducted in the presence of OWASA's Engineer, the Contractor and a representative of the pump manufacturer. The rate shall be determined by subtracting the starting static surface elevation of the water in the wetwell from the "off" elevation and multiplying the difference by the volume per vertical foot of wetwell. That number shall then be divided by the number of minutes of pump run time to affect the drop measured. This test shall be performed for each pump and the rates recorded for each pump and included as part of the record in the certified pump test.
- 4) **Manufacturers Start-up Services:** The manufacturer's representative shall be present at pump start up. Co-ordinate station start-up with manufacturer's technical representative. The representative or factory service technician shall inspect the completed installation. They shall calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

3.11 PIPE DESIGN LIFE

In addition to the above noted specifications, the Contractor shall secure and the manufacturer shall furnish and warrant that sanitary sewer pipe is designed for a 50-year life.

3.12 CLEANUP AND RESTORATION OF SITE

After the backfill is completed, the contractor shall dispose of all surplus material, dirt and rubbish from the site, and shall keep the site free of mud and dust to the satisfaction of OWASA's Engineer. The Contractor may be required to flush or sprinkle the street to prevent dust nuisance. It is important that clean up and restoration of the site follows the work closely. The Contractor shall dispose of surplus material and clean the street at the end of each day for the portion of work completed that day unless additional cleaning is required. After all work is completed, the Contractor shall remove all tools and other equipment, leaving the site free, clean, and in good condition.

TABLE II VACUUM TEST TABLE FOR MANHOLES BASED ON ASTM C1244					
MINIMUM TEST TIMES FOR VARIOUS manhole DIAMETERS FOR PRESSURE DROP FROM 10 INCHES TO 9 INCHES HG.					
DIAMETER (FEET)					
Depth (FT)	4	4.5	5	5.5	6
TIME (SECONDS)					
6	15				
8	20	23	26	29	33
10	25	29	33	36	41
12	30	35	39	43	49
14	35	41	46	51	57
16	40	46	52	58	67
18	45	52	59	65	73
20	50	53	65	72	81
22	55	64	72	79	89
24	59	64	78	87	97
26	64	75	85	94	105
28	69	81	91	101	113
30	74	87	98	108	121

END OF SECTION 02530
Back to top



SECTION 02900 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Work shall include, but not limited to, the following:
 - 1. Surface preparation of subsoil
 - 2. Placing topsoil
 - 3. Addition of lime and fertilizer
 - 4. Seeding
 - 5. Maintenance to produce a permanent stand of grass

1.2 RELATED SECTIONS

- A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility for proper coordination of all the work:
 - 1. Section 02370 – Erosion and Sedimentation Controls
 - 2. Section 02275 – Trenching, Backfilling, and Compaction of Utilities
 - 3. Refer to the Drawings for additional detail on seeding

1.3 REFERENCES

- A. North Carolina Department of Agriculture
- B. United States Department of Agriculture

1.4 PERFORMANCE REQUIREMENT

- A. Grassed areas shall be considered established when it presents a green appearance from eye level 50 feet away and the grass is vigorous and growing well in each square foot of seeded area.
- B. Should the permanent seed not germinate and produce a stand of grass, reseed affected areas until a permanent stand is established.

1.5 SUBMITTALS

- A. Not less than 6 weeks prior to seeding, obtain representative soil samples from areas to be seeded and deliver the properly packaged samples with an information sheet for each sample properly filled out to the Soils Division of the North Carolina Department of Agriculture or a private laboratory. Based on the

test results, submit to the Engineer or Owner a recommendation as to the quantity and type of lime, fertilizer, and seed for the area covered by the test.

1.6 QUALITY ASSURANCE

- A. Quality of fertilizer, lime, and seed, and operations in connection with the furnishing of this material, shall comply with the requirements of the North Carolina Fertilizer, Lime, and Seed Law; and with the requirements of the rules and regulations adopted by the North Carolina Department of Agriculture in accordance with the provisions of the said law.
- B. Seed containers shall bear an official "Certified Seed" label as inspected by the North Carolina Crop Improvement Association.
- C. Packages for soil conditioners and fertilizer shall bear manufacturer's guaranteed analysis.
- D. Do not apply lime, fertilizer, or seed in strong wind, when the soil is extremely wet or frozen, or otherwise unworkable. No rolling shall be done if precipitation after seeding would make the operation detrimental to the seed bed.
- E. All landscaping surface features, including but not limited to topsoil, seeding, bushes and trees, shall be replaced and constructed in accordance with the latest design requirements as specified by the NCDOT, the University of North Carolina at Chapel Hill Department of Facilities Services or the Town of Chapel Hill Department of Public Works.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver grass seed mixture in sealed containers showing percentage of seed mix, year of production, net production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizers in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.8 MAINTENANCE SERVICE

- A. Maintain seeded areas until grass is well established and exhibits a vigorous growing condition for a minimum of two cuttings. Mow grass at regular intervals to a maximum height of 3-inches. Hand clip where necessary.
- B. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- C. Water areas seeded between May 1st and July 15th at such intervals as to maintain the seeded area in a moist condition until the grass is established and accepted by the Engineer or Owner. Provide equipment to transport and distribute the water to the seeded areas. Areas seeded between September 1st, and November 1st need not be irrigated beyond the initial watering specified above except that the Contractor may apply water at his own discretion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds, and roots; pH value of minimum 5.4 and a maximum of 7.0.
- B. Lime: Ground Dolomitic agricultural limestone, not less than 85% total carbonates, ground so that 50% passes 100 mesh sieve and 90% passes a 30-mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately based on quantities passing the No. 100 mesh sieve.
- C. Fertilizer: Mixed, commercial, fertilizer containing 10-10-10 percentages of available nitrogen, phosphoric acid, and potash respectively, plus superphosphate with 20% P_2O_5 content. Fertilizer shall be dry, in granular (pellet) form, and shall be delivered to the site in the manufacturer's original bag or container which shall be plainly marked as to formula.
- D. Seed: Fresh seed guaranteed 95% pure with a minimum germination rate of 85% within one year of tests. Provide the following seed mixtures with lime and fertilizer in disturbed areas including NCDOT and Town rights-of-way:

<u>Planting Dates</u>	<u>Grass Type</u>	<u>Pounds per Acre</u>
Year-Round	Pensacola Bahia	50
	KY 31 Tall Fescue	160
	Centipede	5
Lime		4,000
Fertilizer	10-10-10	500
Mulch	Straw	4,000

On all 2 to 1 slopes, delete Centipede and add 25 pounds per acre of Riparian Buffers and Wetland Seeding Mixture.

- E. Contractor shall ensure seeding selection conforms to the North Carolina Sediment and Erosion Control Design Manual, latest revision.
- F. If the pipeline will be installed through a landscaped lawn, the seeding shall be modified to restore ground cover comparable to the existing lawn.
- G. Matting / Erosion Control Blanket: As specified in Section 02370 – Erosion and Sedimentation Controls.

1. Approval of matting will require manufacturer's design data regarding velocity, ditch slopes, method of installation, decay cycle, repair techniques, and grass growth enhancement characteristics.
- H. Wire Staples: As specified in Section 02370 – Erosion and Sedimentation Controls.
- I. Mulch: Threshed straw of oats, wheat, or rye; free from seed of obnoxious weeds; or clean salt hay. Straw which is fresh and excessively brittle or straw which is in such an advanced stage of decomposition as to smother or retard growth of grass will not be acceptable.
- J. Water: Water shall be free from substances harmful to growth of grass.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBSOIL

- A. Complete operations in the area to be seeded and prepare subsoil to eliminate uneven areas and low spots. Bring surface to the approximate design contours.
- B. Scarify subsoil to a depth of 3-inches. Remove weeds, roots, stones, and foreign materials 1-1/2 inches in diameter and larger.

3.2 PLACING TOPSOIL

- A. Place topsoil during dry weather and on dry unfrozen subsoil.
- B. Spread amendment to a minimum depth of 2inche. Remove vegetable matter and foreign non-organic material from topsoil while spreading. Grade surface in order to provide positive drainage and prevent water ponding. Lightly compact topsoil with at least one pass of a cultipacker or similar equipment
- C. Maintain the finished surfaces by protecting and replacing topsoil, and subsoil, as necessary until the area is accepted by the Owner or Engineer.

3.3 APPLICATION OF LIME

- A. Liming shall be done immediately after grading has reached the fine grading stage, even though actual seeding may not be done until several months later.
- B. Spread lime evenly by means of a mechanical distributor.
- C. When lime is distributed by commercial liming dealers, sales slips showing the tonnage delivered shall be filed with the Engineer or Owner and shall show the full tonnage required for the acres treated.
- D. Incorporate lime into the top 2 to 3 inches of soil by harrowing, disking, or other acceptable means.

3.4 APPLICATION OF FERTILIZER

- A. Spread fertilizer not more than 2 weeks in advance of seeding.
- B. To verify application rate, determine acreage to be fertilized and provide Engineer or Owner with total weight of fertilizer applied to the area.
- C. Provide mechanical spreader for even distribution and spread half of the rate in one direction, and the other half at right angles to the first. Mix thoroughly into upper 2 to 3 inches of soil by disking, harrowing, or other acceptable methods.

3.5 SEEDING

- A. Accomplish seeding by means of an accepted power-drawn seed drill, combination corrugated roller-seeder, accepted hand operated mechanical seeder, or other acceptable methods to provide even distribution of seed.
- B. Do not seed when ground is excessively wet, excessively dry, or frozen. After seeding, roll area with a roller, not less than 18 inches in diameter and weighing not more than 210 pounds per foot of width. Upon completion of rolling, water area with a fine spray.
- C. Immediately following seeding, apply mulch or matting. Do not seed areas more than that which can be mulched on the same day.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4-inches of soil depth.

3.6 MULCHING AND MATTING

- A. Apply mulch or matting as required to retain soil and grass, but no less than the following:
 - 1. Slopes from 0 to 19% by spreading a light cover of mulch over seeded area at the rate of not less than 85 pounds per 1,000 square feet.
 - 2. Slopes equal to or greater than 20%, within limits of a ditch, or where noted on the Drawings, mulch with matting. Pin matting to the ground with wire staples at 5-foot intervals, immediately after seeding. Plastic matting will not be allowed.
 - a. Install mulch with matting in accordance with Section 02370 – Erosion and Sedimentation Controls.
 - 3. Use mulch stabilizers to prevent disruption of mulch. Mulch stabilizer shall be approved by the Owner.
- B. Tack composed of asphalt, emulsified asphalt, or similar asphaltic products shall not be used.
- C. An accepted jute mesh or net may be used in lieu of tacking straw mulch.
- D. Other types of mulch and anchoring methods may be used upon acceptance by the Engineer or Owner. Anchoring mulch with straightened disk blades will not be accepted.

3.7 PROTECTION

- A. Protect seeded areas from damage by barricades, signs, and other appropriate means. Maintain and protect slopes from weather damage.

END OF SECTION 02900

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work shall include, but not be limited to the following:

1. Thrust blocks
2. Concrete pavement
3. Concrete sidewalk, and curbs and gutters
4. Concrete encasement
5. Miscellaneous concrete

1.2 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all work.

1. Section 02275 – Trenching, Backfilling, and Compaction of Utilities
2. Section 02510 – Water Distribution

1.3 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

B. American Concrete Institute:

1. ACI 301 – Specifications for Structural Concrete
2. ACI 305 – Hot Weather Concreting
3. ACI 306.1 – Standard Specification for Cold Weather Concreting
4. ACI 308.1 – Standard Specification for Curing Concrete
5. ACI 318 – Building Code Requirements for Structural Concrete Commentary

C. ASTM International:

1. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33 – Standard Specification for Concrete Aggregates
3. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

4. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete
 5. ASTM C143 – Concrete Slump Testing
 6. ASTM C150 – Standard Specification for Portland Cement
 7. ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete
 8. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
 9. ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 10. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 11. ASTM D1752 – Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
 12. ASTM D6690 – Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- D. North Carolina Department of Transportation – Standard Specifications for Roads and Structures, latest version

1.4 SUBMITTALS

- A. Submit the following in accordance with Section 01 13 00 – Submittals:
1. Delivery Tickets: Submit copy of delivery tickets to the Engineer (if concrete batch services are used) for each batch of ready mixed concrete delivered in accordance with ASTM C94. Indicate total water content.

1.5 QUALITY ASSURANCE

- A. Conform to ACI 305 when concreting during hot weather.
- B. Conform to ACI 306.1 when concreting during cold weather.
- C. Methods and materials of Work shall conform to the requirements of the standards and codes and recommended practices as referred to within this Section.
- D. Perform Work in accordance with latest North Carolina Department of Transportation – Standard Specifications for Roads and Structures, latest version.
- E. Testing for compressive strength will be at the frequency as deemed appropriate by the Engineer or Owner. Testing will comply with ASTM C31 and ASTM C39.
- F. All concrete surface features, including but not limited to curb, curb and gutter, and sidewalks, shall be constructed in accordance with the latest design requirements

as specified by the University of North Carolina at Chapel Hill Department of Facilities Services or the Town of Chapel Hill Department of Public Works.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Protect cement from contamination or damage during handling. Do not use cement which has been damaged, is partially set, lumpy, or caked. If the damaged cement is in bags, the entire contents of the bag shall be rejected. Do not use cement salvaged from used bags or reclaimed from cleaning bags.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I – Different brands of cement, different types of cement, or the same brand of cement from different mills shall not be mixed, nor shall they be used alternately, except when authorized by the Owner or Owner's representative.
 - 1. In proportioning concrete materials 1 bag or sack of cement shall be considered as being 1 cubic foot volume and 94 pounds weight. Portland cement shall be measured by weight when bulk cement is used and where in batching it is necessary to use a portion of a bag or sack. A barrel is equivalent to four bags or sacks, or 376 pounds net.
 - 2. When bulk cement is used, the weighing and handling shall be inspected by the Owner or Owner's representative prior to use.
- B. Water: ACI 318; potable.

2.2 AGGREGATES

- A. Fine aggregate for use in classes of concrete (except lightweight concrete) and Portland cement mortars, except mortars for masonry work, shall conform with ASTM C33 and as specified in accordance with NCDOT Section 1014, "Aggregate for Portland Cement Concrete", Paragraph 1014-1, "Fine Aggregate", and graded as specified in NCDOT Table 1005-2 of Section 1005. Fine aggregate for lightweight concrete shall be as specified above or lightweight sand as necessary to meet the required density and compressive strength.
- B. Coarse aggregate for normal concrete shall be in accordance with ASTM C33 and graded as specified in NCDOT Table 1005-1 of Section 1005. Coarse aggregate for lightweight concrete shall be as specified in ASTM C330 as required to meet the density and compressive strength requirements.

2.3 FORMS

- A. Forms except as otherwise specified shall be of plywood, steel, or other acceptable material. Plywood shall be concrete form plywood, not less than 5/8-inch thick. Surfaces of steel forms shall be free from irregularities, dents, and sags.

2.4 CONCRETE MIX

- A. Provide concrete to the following minimum criteria. Each mix shall be proportioned as specified by weight and use the aggregate and cement proposed for the project. Mix designs shall be in accordance with the latest ACI specifications.

Material and Property	Measurement
Compressive Strength (28 day)	3,000 psi*
Cement Type	ASTM C150
Aggregate Type	Normal weight
Water-Cement Ratio (maximum)	0.46 by weight
Aggregate Size (maximum) & Type	3/4-inch stone
Slump Limit	5 inches (plus or minus 1 inch)
Air Content	6 percent (plus or minus 1 percent)

**or as specified for particular use*

- B. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M
- C. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 - EXECUTION

3.1 PREPARATION

A. Mixing and Delivery:

1. All concrete under this Specification shall be machine mixed, where the volume to be placed is equal to or greater than 1 cubic yard. Hand mixing is allowed where the volume to be placed is less than 1 cubic yard.
2. Hand mixing shall be permitted when the amount of concrete required for any job is less than 1 cubic yard. Hand mixed concrete shall be mixed on a watertight platform or in a mortar box in batches not to exceed 1/3 cubic yards each. The aggregate shall first be spread in a uniform layer over which the required quantity of cement shall be evenly distributed. The entire batch shall be turned with shovels until the ingredients are thoroughly blended before adding the water. After adding the proper amount of water, the batch shall again be turned with shovels until a uniform consistency is obtained.

B. Site Mixed Concrete:

1. Concrete shall be machine mixed; in emergencies mixing may be by hand as directed. Except when ready mixed concrete is used, mixers shall be stationary or truck mixers. The mixer shall be of an adequate size to accommodate the maximum batch and shall be rotated at the rate specified by the manufacturer.

The mixer shall be equipped with an automatic timing device to prevent discharge of the concrete until the specified mixing time has elapsed. The mixer shall be equipped with an accurate water measuring and control device, and be capable of producing a homogeneous concrete mixture of uniform color.

2. Apparatus provided for weighing aggregate and cement shall be designed especially for this purpose. Weigh fine and coarse aggregate, and cement separately. Cement in standard packages need not be weighed, but bulk cement or fractional packages shall be weighed. Accuracy of measuring devices shall be such that successive quantities can be measured to within one percent of required amount. Measuring devices shall be subject to verification.
3. Do not exceed rated capacity of mixer. Time of mixing after cement and aggregates are in the mixer drum shall not be less than one minute for one cubic yard or less and increased 15 seconds for each additional cubic yard or fraction thereof in capacity. The total required water shall be in the drum before one-fourth of the mixing time has elapsed. Mixer drum shall rotate at a peripheral speed of about 200 feet per minute throughout the mixing period.
4. Discharge entire contents of mixer drum before recharging. Provide necessary equipment and establish accurate procedures subject to Owner's or Owner's representative's approval for determining the quantity of free moisture in the aggregates. Moisture determination shall be made at intervals as directed by Owner or Owner's representative.
5. The retempering of concrete which has partially hardened, i.e., mixing with or without additional cement, aggregate, or water, will not be permitted.

C. Ready Mixed Concrete:

1. Ensure central plant ready mix concrete is acceptable and shall be delivered to the work site with adequate plasticity and workability. Ready mix concrete shall be delivered to the work site and pouring begun within a period of 1.5 hours after the introduction of water to the cement and aggregates.
2. Ready mixed concrete plant shall be properly equipped for the accurate proportioning and proper mixing and delivery of the concrete, including the proper water measurements and controls, as specified above. Plant shall have sufficient capacity and transportation equipment to deliver the concrete at the required rate. Plant shall be subject to inspection and approval of the Owner or Owner's representative.
3. Mix and handle ready mixed concrete in accordance with ASTM C94/C95M.

- D. Any concrete mixture that fails the slump requirements or is rejected by the Owner or Owner's representative, shall not be used and shall be properly removed from the site at no additional cost.
- E. Remove debris and ice from formwork and concrete substrates.
- F. Remove water from areas receiving concrete before concrete is placed.

3.2 CONVEYING

- A. Convey concrete from mixer to its final position as rapidly as practicable by acceptable methods which will not cause segregation or loss of ingredients. Deposit concrete as nearly as practicable in its final position to avoid rehandling. Free vertical drop of concrete shall not exceed 3 feet. Chuting will be permitted only where the concrete is deposited into a hopper before it is placed in the forms. Clean conveying equipment before each run. Deposit concrete as soon as practicable after the forms have been coated. Place concrete before the initial set and not later than 30 minutes after mixing or agitating. Concrete which has segregated in conveying shall not be used.
- B. No concrete shall be used which does not reach its final position in the forms within 1 hour after water is introduced to the mix, except when concrete is continually agitated, in which the time may be extended to between 1 and 1.5 hours. Concrete that has aged beyond 1.5 hours shall be rejected and properly removed from site by the Owner or Owner's representative at no additional cost.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Placing Concrete in Cold Weather: Do not place concrete when the atmospheric temperature is below 40 degrees F, or when the concrete is likely to be subjected to freezing temperatures within 24 hours after placement. Heat concrete as necessary to maintain a concrete temperature of between 60 and 80 degrees F when placed. When applicable, comply with ACI 306.1 – Standard Specification for Cold Weather Concreting. Always remove frozen material from aggregates and thaw before placing in the mixer.
- C. Placing Concrete in Hot Weather: When the outdoor ambient temperature is over 90 degrees F or as directed by the Owner or Owner's representative, provide methods so the temperature of the concrete as placed shall not exceed 90 degrees F. Shade concrete after placing and start curing as soon as the surface of the fresh concrete is sufficiently hard to permit further hardening without damage. Unless specified otherwise, the control of hot weather concreting and the methods employed to control the temperature of the material both during placing and curing operation shall be in accordance with ACI 305 – Hot Weather Concreting.
- D. Deposit concrete at final position. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the any installed reinforcement.
- E. After initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of the projecting reinforcement.
- F. Concrete shall be compacted by continuous working with a suitable tool or by vibrating the forms in a manner acceptable to the Owner or Owner's representative.
- G. Concrete shall be placed in horizontal layers not more than 12 inches thick, except as accepted by the Engineer.

- H. Each layer shall be placed and compacted before the preceding batch has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the batches.
- I. Each layer shall be compacted so as to avoid the formation of a construction joint with a preceding layer which has not taken initial set.
- J. All concrete shall be placed so as to be properly finished and curing begun during daylight hours. At no time shall concrete be placed which will require the finishing, etc., to be performed by artificial light.
- K. Do not place concrete during rain events.

3.4 INSPECTION

- A. Proper facilities shall be provided for the inspection and sampling of concrete at the mixing plant, loading plant, and place of delivery, or as directed by the Owner's representative.
- B. The manufacturer shall afford the Owner's representative, without charge to the Owner, all reasonable facilities for securing samples to determine if the concrete is being furnished in accordance with the Contract Documents and as specified by the Engineer. All inspection and sampling shall be conducted so as not to interfere unnecessarily with the manufacture and delivery of the concrete.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Curing shall be accomplished by preventing loss of moisture, rapid temperature change, and mechanical injury or injury from rain or flowing water for a period of 7 calendar days when normal Portland cement has been used or 3 calendar days when high-early-strength Portland cement has been used. Curing shall be started after placing and finishing the concrete is finished, and after all free water has disappeared from the surface of the concrete. Keep wood forms sufficiently damp to prevent drying out of the concrete.
- D. Moist curing may be accomplished by covering concrete with burlap, cotton, or other acceptable fabric mats, or with sand, and shall be kept continually wet. Forms shall be kept continually wet and not removed before the end of the curing period.

3.6 SAMPLING AND TESTING

- A. The Contractor shall provide two cylinders for breaking at seven calendar days and three cylinders for breaking at 28 calendar days, or as directed by the Engineer.
- B. The concrete shall meet or exceed the strength as specified in the Contract Documents or as directed by the Engineer, at both the 7-day test and the 28-day

test. Failure to meet the specified strength tests is grounds for rejection of the work at no additional cost.

- C. Concrete placed for pipe encasement shall be 3,000 psi minimum strength at 28-days hydration. Concrete encasement shall only be used when directed by the Engineer or Owner.
- D. The Contractor shall hire an accepted independent testing firm to perform all required concrete testing and will be reimbursed for payment of successful concrete tests per the terms in the Contract Documents.
- E. Test results shall be delivered to the Engineer by the testing laboratory with copies sent to the Contractor and the Owner.

END OF SECTION 03300

Appendix A

Project Permits

Appendix A.1

**North Carolina Department of Environmental Quality
Division of Water Resources Public Water Supply Section Engineering
Plans and Specifications for
Water Supply Systems Approval**



NORTH CAROLINA
Environmental Quality

JOSH STEIN

Governor

D. REID WILSON

Secretary

RICHARD E. ROGERS, JR.

Director

March 3, 2026

OWASA Board of Directors

Attention: Todd Taylor, P.E., Executive Director

400 Jones Ferry Road

Carrboro, NC 27510

Re: Engineering Plans Approval
Distribution Extension
Burning Tree Drive Water Line Replacement
ORANGE WATER & SEWER AUTHORITY
Water System No.: NC0368010
Orange County
Serial No.: 25-01283

Dear Applicant:

Enclosed please find one copy of the "Application for Approval..." together with one copy of the referenced engineering plans bearing the Division of Water Resources stamp of approval for the referenced project. These engineering plans are approved under Division of Water Resources Serial Number, 25-01283 dated March 3, 2026.

Engineering plans prepared by Larry Alewine, P.E. call for the installation of 4,630 linear feet of 8-inch water main, 920 linear feet of 2-inch water main, fire hydrants, valves, and associated appurtenances along Burning Tree Drive, Canterbury Lane, and Torrey Pines Lane to serve existing single family residences for the Burning Tree Drive Water Line Replacement project in Chapel Hill, Orange County. The proposed 8-inch water main along Burning Tree Drive will connect to an existing 8-inch water main along NC Highway 54 and an existing 8-inch water main along Pinehurst Drive. The replaced water mains will be removed or properly abandoned. Construction of this project must be in accordance with Orange Water & Sewer Authority's standard specifications.

Please note that in accordance with 15A NCAC 18C .0309(a), no construction, alteration, or expansion of a water system shall be placed into service or made available for human consumption until the Public Water Supply Section has issued Final Approval. Final Approval will be issued and mailed to the applicant upon receipt of both an Engineer's Certification and an Applicant's Certification submitted in accordance with 15A NCAC 18C .0303 (a) and (c).



North Carolina Department of Environmental Quality | Division of Water Resources
512 North Salisbury Street | 1634 Mail Service Center | Raleigh, North Carolina 27699-1634
919.707.9100

These plans in the foregoing application are approved insofar as the protection of public health is concerned as provided in the rules, standards and criteria adopted under the authority of Chapter 130A-317 of the General Statutes. This approval does not constitute a warranty of the design, construction or future operation of the water system.

One copy of the "Application for Approval..." and a copy of the plans with a seal of approval from the department are enclosed. One copy of the approved documents in a digital format is being forwarded to our Raleigh Regional Office. Another copy is being retained in our records.

If the Public Water Supply Section can be of further service, please call (919) 707-9100.

Sincerely,



Rebecca Sadosky, Ph.D., Chief
Public Water Supply Section
Division of Water Resources

RS/RS

Enclosures: Approval Documents

cc: Joel Martinez, Raleigh Regional Office
Orange County Health Department
McKim & Creed



JOSH STEIN
Governor

D. REID WILSON
Secretary

RICHARD E. ROGERS, JR.
Director



March 03, 2026

OWASA BOARD OF DIRECTORS
ATTN: TODD TAYLOR, PE, EXECUTIVE DIRECTOR
400 JONES FERRY RD
CARRBORO, NC 27510

Re: **Authorization to Construct (This is not a Final Approval)**
Issue Date: March 03, 2026
BURNING TREE DRIVE WATER LINE REPLACEMENT
Serial No.: 25-01283 Water System No.: NC0368010
Orange County

Dear Applicant:

This letter is to confirm that a complete Engineer's Report and a Water System Management Plan have been received, and that engineering plans and specifications have been approved by the Department for **BURNING TREE DRIVE WATER LINE REPLACEMENT, Serial No.: 25-01283**.

The "Authorization to Construct" is valid for 36 months from the issue date. Authorization to construct may be extended if the Rules Governing Public Water Systems [15A NCAC 18C] and site conditions have not changed (see Rule .0305). The "Authorization to Construct" and the engineering plans and specifications approval letter shall be posted at the primary entrance of the job site before and during construction.

Upon completion of the construction or modification, **and prior to placing the new construction or modification into service**, the applicant must submit an Engineer's Certification and Applicant's Certification to the Public Water Supply Section.

- **Engineer's Certification:** in accordance with Rule .0303(a), the applicant shall submit a certification statement signed and sealed by a registered professional engineer stating that construction was completed in accordance with approved engineering plans and specifications, including any provisions stipulated in the Department's engineering plan and specification approval letter.
- **Applicant's Certification:** in accordance with Rule .0303(c), the applicant shall submit a signed certification statement indicating that the requirements for an Operation and Maintenance Plan and Emergency Management Plan have been satisfied in accordance with Rule .0307(d) and (e) and that the system has a certified operator in accordance with Rule .1300. The "Applicant's Certification" form is available at <http://www.ncwater.org/> (click on Public Water Supply Section, Plan Review, Plan Review Forms).

Certifications can be sent by mail or attachment to an e-mail message to **PWSSection.PlanReview@deq.nc.gov**.

If this "Authorization to Construct" is for a new public water system, the owner must submit a completed **application for an Operating Permit** and the appropriate fee. For a copy of the application for an Operating Permit please call (919) 707-9076.

Once the certifications and permit application and fee (if applicable) are received and determined adequate, the Department will issue a Final Approval letter to the applicant. In accordance with Rule .0309(a), **no portion of this project shall be placed into service until the Department has issued Final Approval**.

Please contact us at (919) 707-9100 if you have any questions or need additional information.

Sincerely,

A handwritten signature in dark ink, appearing to read "RBSadosky".

Rebecca Sadosky, Ph.D., Chief
Public Water Supply Section
Division of Water Resources, NCDEQ

cc: JOEL MARTINEZ, Regional Engineer
MCKIM & CREED



North Carolina Department of Environmental Quality | Division of Water Resources
512 North Salisbury Street | 1634 Mail Service Center | Raleigh, North Carolina 27699-1634
919.707.9100

North Carolina Department of Environmental Quality
Division of Water Resources

Authorization to Construct

Project Applicant:	OWASA BOARD OF DIRECTORS
Public Water System Name:	ORANGE WATER & SEWER AUTHORITY
Water System No.:	NC0368010
Project Name:	BURNING TREE DRIVE WATER LINE REPLACEMENT
Serial No.:	25-01283
Issue Date:	March 03, 2026
Expiration Date:	36 Months after Issue Date

In accordance with 15A NCAC 18C .0305, this Authorization to Construct must be posted
at the primary entrance to the job site during construction.

LARRY ALEWINE, PE
MCKIM & CREED
4300 EDWARDS MILL ROAD
RALEIGH, NC 27612

Appendix A.2

**North Carolina Department of Environmental Quality
Division of Energy, Mineral, and Land Resources
Erosion and Sedimentation Control Plan Approval with Modifications**

(not included in this submittal)

Appendix A.3

**North Carolina Department of Environmental Quality
Division of Energy, Mineral, and Land Resources
NCG01 – Certificate of Coverage**

(not included in this submittal)

Appendix B

Geotechnical Report



Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Burning Tree Drive Water Line

Chapel Hill, North Carolina

F&R Project No. 66C-0111

Prepared For:

McKim & Creed, Inc.

4300 Edwards Mill Road, Suite 200

Raleigh, North Carolina 27612

Prepared By:

Froehling & Robertson, Inc.

310 Hubert Street

Raleigh, North Carolina 27603

November 13, 2024



November 13, 2024

Larry Alewine
Project Manager
McKim & Creed, Inc.
4300 Edwards Mill Road, Suite 200
Raleigh, North Carolina 27612

**Subject: Report of Subsurface Exploration &
Geotechnical Engineering Evaluation
Burning Tree Drive Water Line**
Chapel Hill, North Carolina
F&R Project No. 66C-0111

Mr. Alewine:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the Burning Tree Drive Water Line project in Chapel Hill, North Carolina. Our services were performed in general accordance with F&R's Proposal No. 2466-00024, dated February 9, 2024. The attached report presents our understanding of the project, reviews our exploration procedures, and describes existing site and subsurface conditions.

We have enjoyed working with you on this project, and are prepared to assist you with the recommended quality assurance observation and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,

FROEHLING & ROBERTSON, INC

Dave Morse, M.S., E.I.
Geotechnical Staff Engineer



Michael S. Sabodish Jr., Ph.D., P.E.
Geotechnical Department Manager



TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE & SCOPE OF SERVICES	1
2.0 PROJECT INFORMATION	1
2.1 SITE LOCATION AND DESCRIPTION	1
2.2 PROPOSED CONSTRUCTION	1
3.0 EXPLORATION PROCEDURES	2
3.1 SUBSURFACE EXPLORATION	2
3.2 FIELD RESISTIVITY TESTING	3
3.3 LABORATORY TESTING	3
4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS	4
4.1 REGIONAL GEOLOGY	4
4.2 GENERAL	4
4.2.1 Surficial Materials	5
4.2.2 Existing Fill Soils	5
4.2.3 Residual Soils	6
4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS	6
4.4 SOIL CORROSIVITY EVALUATION	7
5.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS	8
5.1 GENERAL	8
5.2 OPEN-CUT CONSTRUCTION	8
5.3 STRUCTURAL FILL PLACEMENT AND COMPACTION	9
5.4 DEWATERING	10
5.5 TEMPORARY EXCAVATION RECOMMENDATIONS	11
6.0 CONTINUATION OF SERVICES	12
7.0 LIMITATIONS	12



APPENDICES

APPENDIX I

Site Vicinity Map, Figure No. 1
Boring Location Plan, Figures No. 2, 2A, and 2B
Subsurface Profile, Figure No. 3

APPENDIX II

Key to Soil Classification
Unified Soil Classification Chart
Boring Logs

APPENDIX III

F&R Laboratory Test Results
Field Resistivity Test Results
Corrosivity Test Report

APPENDIX IV

GBA Document "Important Information about Your Geotechnical Engineering Report"



1.0 PURPOSE & SCOPE OF SERVICES

The purpose of this subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions along Burning Tree Drive for a planned water line installation project in Chapel Hill, North Carolina, and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

- Completion of two soil test borings (B-1 and B-2) to a depth of 10 feet each below the existing ground surface;
- Preparation of typed Boring Logs and development of a Subsurface Profile;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing field electrical resistivity tests at two locations (R-1 and R-2);
- Providing corrosivity analyses for two selected representative soil samples;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this geotechnical report by professional engineers.

2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The project site is located on Burning Tree Drive in Chapel Hill, Orange County, North Carolina, as shown on the Site Vicinity Map presented as Figure 1 in Appendix I. The soil test boring and field resistivity locations were selected by McKim & Creed and were shown on the provided drawings “Burning Tree Water Line Replacements – Test Locations, OWASA” (Sheets 1 and 2) prepared by McKim & Creed, dated 10/2/2024. From observations made during our field work, existing site conditions within the area of our subsurface exploration included a residential roadway with a grassy to lightly-vegetated right-of-way.

2.2 PROPOSED CONSTRUCTION

F&R understands the project includes the installation of about 5,000 linear feet (lf) of new water line along Burning Tree Drive. F&R has not been provided a plan and profile showing the water line location and depth below existing ground surface. However, we understand the minimum



depth of pipe cover for this project is 3.5 feet. Therefore, F&R assumes the water line will be installed by traditional open-cut techniques.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced two (2) widely-spaced soil test borings (B-1 and B-2) to depths of 10 feet each below the existing ground surface. The borings were advanced at the approximate locations shown on the Boring Location Plan presented as Figure 2 in Appendix I. The test boring locations were established in the field by F&R using a hand-held GPS unit. Ground surface elevations at the boring locations were interpolated from the Orange County online GIS map database. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced using a track-mounted drill rig using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split-barrel sampler in general accordance with ASTM D1586, Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. The number of blows required to drive the split barrel sampler three consecutive 6-inch increments with an automatic hammer is recorded, and the blows after the first 6-inch increment are summed to obtain the Standard Penetration Test (SPT) N-value representing the penetration resistance of the soil. Five (5) SPT samples were collected in each 10-foot boring.

A representative portion of the soil from each SPT sample was retrieved and sealed in a glass jar, labeled, and transported to our laboratory for classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS) using visual-manual identification procedures (ASTM D2488). The boring logs for this exploration are presented in Appendix II.

Groundwater level measurements were attempted at the termination of drilling in both borings. After attempting groundwater level measurements, the borings were backfilled with soil cuttings



and a one-foot bentonite plug. An asphalt cold patch was placed at the surface of each boring to closely match existing road grades.

3.2 FIELD RESISTIVITY TESTING

F&R performed a field resistivity survey at the referenced project site at two locations, R-1 and R-2, selected by McKim & Creed (see Figures 2A and 2B in Appendix I). We note the location of the field resistivity testing performed near Pinehurst Drive was relocated from the proposed location shown on “Burning Tree Water Line Replacements – Test Locations, OWASA” (Sheet 2) to a test site directly adjacent to Burning Tree Drive, to provide data within the planned project site. The resistivity testing was performed in general accordance with ASTM G57 by the Wenner 4-point method using a Megger DET 5/4D Digital Earth Tester. Resistance measurements were made at each test area using electrodes spaced at approximate intervals of 5, 10, 25, and 50 feet. The results of the resistivity testing are presented in Appendix III of this report.

3.3 LABORATORY TESTING

F&R selected two (2) soil samples and subjected them to routine geotechnical index testing consisting of natural moisture content, sieve analysis (% passing #200 sieve only), and Atterberg Limits determinations. The purpose of the index testing was to aid in both our classification of the soil samples and in development of engineering recommendations. All laboratory testing was performed in general accordance with applicable ASTM standards.

In addition to the index testing, F&R selected two (2) composite samples from each boring for corrosivity testing. The samples were selected based on a range of possible invert depths for the proposed water line provided by McKim & Creed. These samples were submitted to Waypoint Analytical for corrosivity testing, including pH, chloride ions, soluble sulfates, electrical resistivity, redox potential, and sulfides. Details related to test samples and results are presented in Section 4.4 of this report, and all laboratory test results are presented in Appendix III of this report.



4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project site is located in the Triassic Basin of the Piedmont Physiographic Province of North Carolina. This particular formation is a unique geologic unit, which developed 160 million years ago when differential movement occurred along the Jonesboro Fault in this area. The differential movement resulted in a long, narrow, northeast-trending basin, which gradually filled with sediments eroded from upland areas of the surrounding topography. The sediments are thought to be several thousand feet deep and have resulted in sedimentary rock formations which are often encountered within 5 to 10 feet of the ground surface. Per the *Geologic Map of North Carolina (1985)*, this area is typically underlain by conglomerates, fanglomerates, sandstones, and mudstones.

The soils that overlie the weathered rock and bedrock typically consist of silty clays and sandy clays within the upper portion of the soil profile, which are often highly plastic and become less plastic with depth. The surface clayey soils typically transition into fine sandy silts and silty sands to the top of partially weathered rock and rock. The boundary between soil and rock is not sharply defined. This transitional zone, termed “Partially Weathered Rock,” is typically found overlying the Triassic rock formations. Partially Weathered Rock (PWR) is defined, for engineering purposes, as material exhibiting Standard Penetration Resistances in excess of 100 blows per foot (bpf). Weathering is facilitated by fractures, joints, and by the presence of less resistant rock types. Consequently, the profile of the partially weathered rock and hard rock is quite irregular, even over short horizontal distances. PWR was not encountered during our subsurface exploration.

4.2 GENERAL

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. Although individual soil test



borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the boring logs presented in Appendix II of this report.

A subsurface profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site, and is presented as Figure No. 3 in Appendix I. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The actual transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within areas of proposed construction at the project site. More detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II.

4.2.1 Surficial Materials

Asphalt was encountered at the existing ground surface of both borings, with approximate thicknesses of 5 inches in boring B-1 and 4 inches in boring B-2. A layer of ABC stone was encountered immediately beneath the asphalt in both borings, with approximate thicknesses of 12 inches in boring B-1 and 10 inches in boring B-2. The asphalt and ABC stone depths provided in this report are based on driller observations and should be considered approximate and may vary across the project area.

4.2.2 Existing Fill Soils

Fill soils include materials deposited by man, and can be highly variable in composition and consistency. Existing fill soils were encountered below the asphalt and ABC stone in both borings. The fill soils extended to the termination depth of 10 feet in boring B-1, and to a depth of 3.5 feet in boring B-2. These fill soils are likely related to previous site grading activities for the existing roadway. The existing fill soils consisted of firm to stiff high-plasticity clays (USCS – CH) with SPT N-



values ranging from 6 to 13 bpf, and firm low-plasticity silts and clays (USCS – ML & CL) with SPT N-values of 8 blows per foot (bpf).

The highly plastic clays were encountered in both borings immediately beneath the ABC stone, and extended to approximate depths of 6.5 feet in boring B-1, and 3.5 feet in boring B-2.

4.2.3 Residual Soils

Below the existing fill soils, residual soils were encountered in boring B-2 and extended to the boring termination depth of 10 feet. The residual soils consisted of very stiff low-plasticity silt (USCS – ML) with an SPT N-value of 20 bpf, and very dense silty sands (USCS – SM) with SPT N-values ranging from 60 to 71 bpf.

The very dense sands were encountered at an approximate depth of 6.5 feet, and extended to the boring termination depth of 10 feet below the existing ground surface.

4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS

The samples recovered from our subsurface exploration were observed to be in a moist condition (*i.e.*, within 3 to 5 percentage points of the estimated optimum moisture content). Wet and/or saturated soil conditions were not encountered in the borings.

Groundwater level measurements were attempted in both borings at the termination of drilling, and groundwater was not encountered in either boring. Due to the location of the borings within the roadway, both borings were backfilled immediately after drilling, therefore 24-hour groundwater measurements were not be obtained. It should be noted that groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. F&R notes that due to the presence of relatively impermeable clayey soils, wet soils or perched groundwater conditions may be encountered during periods of inclement weather and during seasonally wet periods.



4.4 SOIL CORROSIVITY EVALUATION

Corrosivity potential of soils for the placement of underground utilities is dependent upon several factors, including moisture, pH, Chlorides, Sulfates, Sulfide concentrations, Electrical Resistivity, and Oxidation Reduction Potential (REDOX), in addition to the location of the water table and any Bi-Metallic considerations during placement. Laboratory testing was performed on 2 composite samples, representative of a range of possible invert depths for the proposed water line based on input from McKim & Creed, to determine the potential corrosive characteristics. The completed corrosivity testing results are presented in the table below, and are also included in Appendix III.

Boring	Combined Sample Depth (ft)	pH	Chlorides (mg/kg) ¹	Sulfates (mg/kg) ¹	Sulfides (mg/kg) ¹	Electrical Resistivity (ohm-cm)	Oxidation Reduction Potential (mV)	Moisture Content (%)
B-1 ²	3.5-5 6.5-8	6.5	<291	<407	<29.0	2790	150	14.0
B-2 ²	3.5-5 6.5-8	5.18	<286	<401	<28.6	2180	245	12.7

¹BELOW INDICATED REPORTING LIMITS

²DIPRA LEVEL 2

Based on AWWA C105/A21.5 (Polyethylene Encasement for Ductile-Iron Pipe Systems), the soils at the locations tested have a low to moderate corrosion potential based on the high chlorides and moderate resistivity values. We note the results from the field resistivity testing at R-1 and R-2 fell within the range of values for resistivity as determined from laboratory testing. Using DIPRA's (Ductile Iron Pipe Research Association) "The Design Decision Model for Corrosion of Ductile Iron Pipelines" Figure 1, the site is categorized as Level 2 and DIPRA recommends the use of "V-Bio Enhanced Polyethylene Encasement."

Other corrosive factors such as coal, cinders, peat, mine wastes, and/or landfills are not known and were not observed during the subsurface exploration.



5.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the two (2) soil test borings and two (2) field resistivity tests performed by F&R, laboratory test results, our experience with similar projects and subsurface conditions, and the limited information provided to us regarding the proposed construction. From a geotechnical perspective, it is our opinion that subsurface conditions encountered at the project site are generally suitable for the proposed construction, provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project.

5.2 OPEN-CUT CONSTRUCTION

We assume that open-cut techniques will be used to install the water line along Burning Tree Drive. Based on the subsurface conditions encountered during the exploration, it is anticipated the new water line will be installed in both existing fill soils and residual soils. The existing fill soils were described in a moist condition and exhibited consistencies ranging from firm to stiff (USCS – CH, ML, and CL). The residual soils were also described in a moist condition, and exhibited consistencies ranging from very stiff (USCS - ML) to very dense (USCS –SM). It is not anticipated that difficult excavation conditions will be encountered and the subsurface soils can typically be excavated with conventional backhoes and track excavators.

The invert elevations for the planned water line were not provided, although F&R understands a minimum of 3.5 feet is required for pipe cover. Highly plastic soils (USCS – CH) were encountered to depths of 6.5 feet below the existing ground surface in boring B-1, and 3.5 feet below the existing ground surface in boring B-2. As such, it is possible these high-plasticity soils will be encountered at the bearing grade, and some bearing grade repair may be necessary to provide a stable base for the pipe. It is expected that 1 foot of unsuitable material will be excavated



underneath the invert elevation of the water line and then backfilled to depth with NCDOT #57 stone.

As the planned invert elevations for the water line are not yet known, it is possible that temporary shoring may be required for installation, which will be discussed in subsequent sections of this report.

It should be noted that groundwater and wet soils were not encountered during the exploration. However, as previously discussed, groundwater levels could vary from what has been described in this report. Therefore, depending upon the prevailing weather conditions at the time of construction, groundwater could be encountered and may require dewatering measures such as sumps or well points. Dewatering will be discussed in a subsequent section of this report.

5.3 STRUCTURAL FILL PLACEMENT AND COMPACTION

It is expected that low-plasticity on-site excavated soils (USCS – CL, ML, and SM) will be suitable for use as structural fill/backfill material, provided they are at a moisture content suitable to achieve proper compaction and are stable during compaction at final subgrade. Highly plastic soils (USCS – CH/MH) are generally considered poor material for use as structural fill and are considered poor material for direct support of foundations, slabs, and roadways. As such, where highly plastic soils are encountered, it is generally recommended they be used in non-load bearing areas or in the lower portion of deeper fills, provided they can be properly placed and compacted.

Structural earth fill should be compacted at a moisture content within ± 3 percentage points of the optimum moisture content. All structural earth fill (*i.e.*, fill placed in load bearing areas) should be placed in loose lifts not exceeding 8 inches and be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D698. The top 12 inches of fill should be compacted to at least 98 percent of the Standard Proctor maximum dry density. All structural fill material should be placed and compacted under the full-time observation of a qualified geotechnical engineer, or engineering technician working under the direction of the geotechnical engineer, and



all fill material should be tested at frequent intervals to confirm the recommended degree of compaction is achieved.

As previously stated, some of the on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (*i.e.*, pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than 3 percentage points above the optimum moisture are generally considered to have excessive moisture. During earthwork and construction activities, surface-water runoff must be drained away from construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades. Due to the moisture sensitivity of the on-site soils and potential for wet conditions, it is typically recommended that earthwork operations be performed during the seasonally-drier months (typically May to October) when weather conditions are more-conducive to moisture conditioning of earth fill (*e.g.*, drying) and achieving proper compaction of structural fill. If earthwork is performed during the seasonally-wet months, additional subgrade undercutting and repair will likely be required and it may be difficult to properly compact structural fill.

Exposure to the environment may weaken the soils at the bearing level if excavations remain open for long periods of time. The bearing surfaces should be level or suitably-benched and free of loose soil, ponded water, and debris. If the bearing soils are softened by surface water intrusion, subsurface seepage, or exposure, the softened soils should be removed from the excavation immediately prior to placement of stone or other pipe bedding materials.

5.4 DEWATERING

As previously mentioned, groundwater and wet/saturated soils were not encountered in either of the borings advanced during this exploration. As such, it is not expected that groundwater will be encountered during construction.

In the event that groundwater is encountered during construction, the dewatering system to be used should be selected and designed by the contractor, but may consist of sump pit and



pumping techniques. F&R recommends that groundwater levels should be maintained at least 3 feet or more below proposed excavation depths during construction.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavation during construction, unstable and loosened/softened subgrade conditions could develop, which may require additional subgrade repair (*i.e.*, densification, undercutting & replacement with washed stone, etc.). Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels during construction. Additionally, it is recommended that only excavation contractors experienced in similar type excavations and groundwater control measures should be allowed to perform this work.

5.5 TEMPORARY EXCAVATION RECOMMENDATIONS

As the invert elevations for the planned water line have not been provided, it is possible that open excavations may require temporary shoring (*e.g.* trench boxes). However, the type of excavation stabilization or shoring system used should be selected and designed by the contractor. It should be noted that excavations will extend through existing fill soils, which can be highly variable in composition and consistency. Therefore, flatter side slopes and/or special excavation or stabilization systems may be required.

Excavations required of this project should be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations), or other applicable municipal and/or county codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that actual excavation slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the “competent person” and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested to by the owner, designer, or contractor’s “competent person”.



6.0 CONTINUATION OF SERVICES

As previously discussed, a geotechnical engineer should be retained to monitor and test earthwork activities, and observe subgrade preparations for the project. It should be noted that actual soil conditions will vary across this site and thus the presence of the geotechnical engineer or their representative during construction will serve to validate the subsurface conditions and recommendations presented in this report.

A geotechnical engineer should be retained to monitor the earthwork and to report that recommendations contained in this report are completed in a satisfactory manner. The continued geotechnical engineering involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify the recommendations presented in this report have been properly interpreted and implemented;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before placing structural fill;
- Observe the placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of McKim & Creed and/or their agents, for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the previously-described subsurface exploration program, and generally-accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations or in unexplored areas of the site. As with any subsurface assessment, actual conditions exist only at the precise locations from



which the samples were taken. Certain inferences are based on the results of sampling to form a professional opinion of conditions in areas beyond those from which the samples were taken.

There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this information.

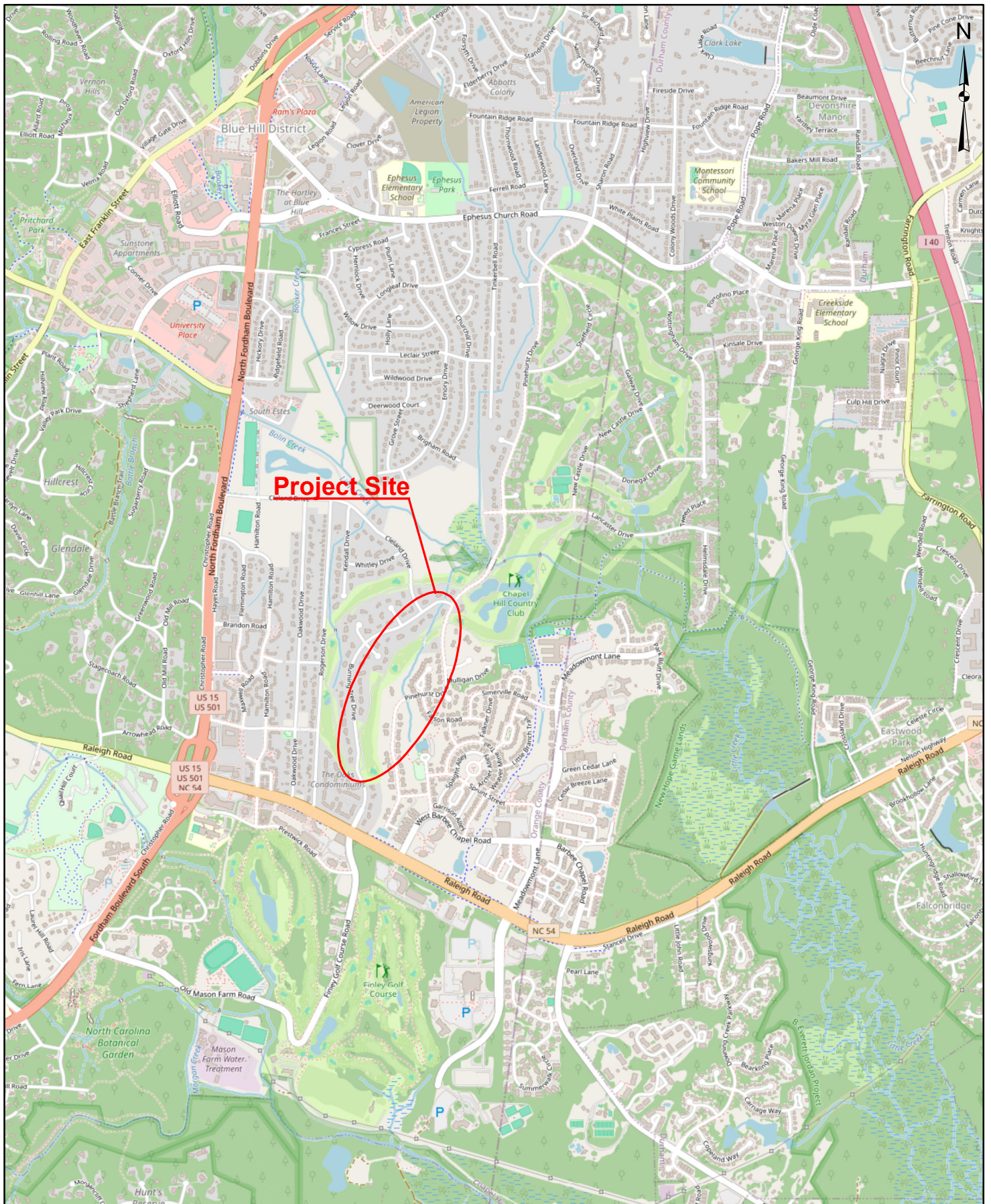
Regardless of the thoroughness of a subsurface exploration, it is possible that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that construction processes have altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the design or location of the proposed water line, the recommendations presented in this report shall not be considered valid unless the changes are reviewed by our firm, and conclusions of this report are modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.



APPENDIX I

FIGURES



Site Vicinity Map

0 500 1,000 2,000 3,000 4,000 Feet



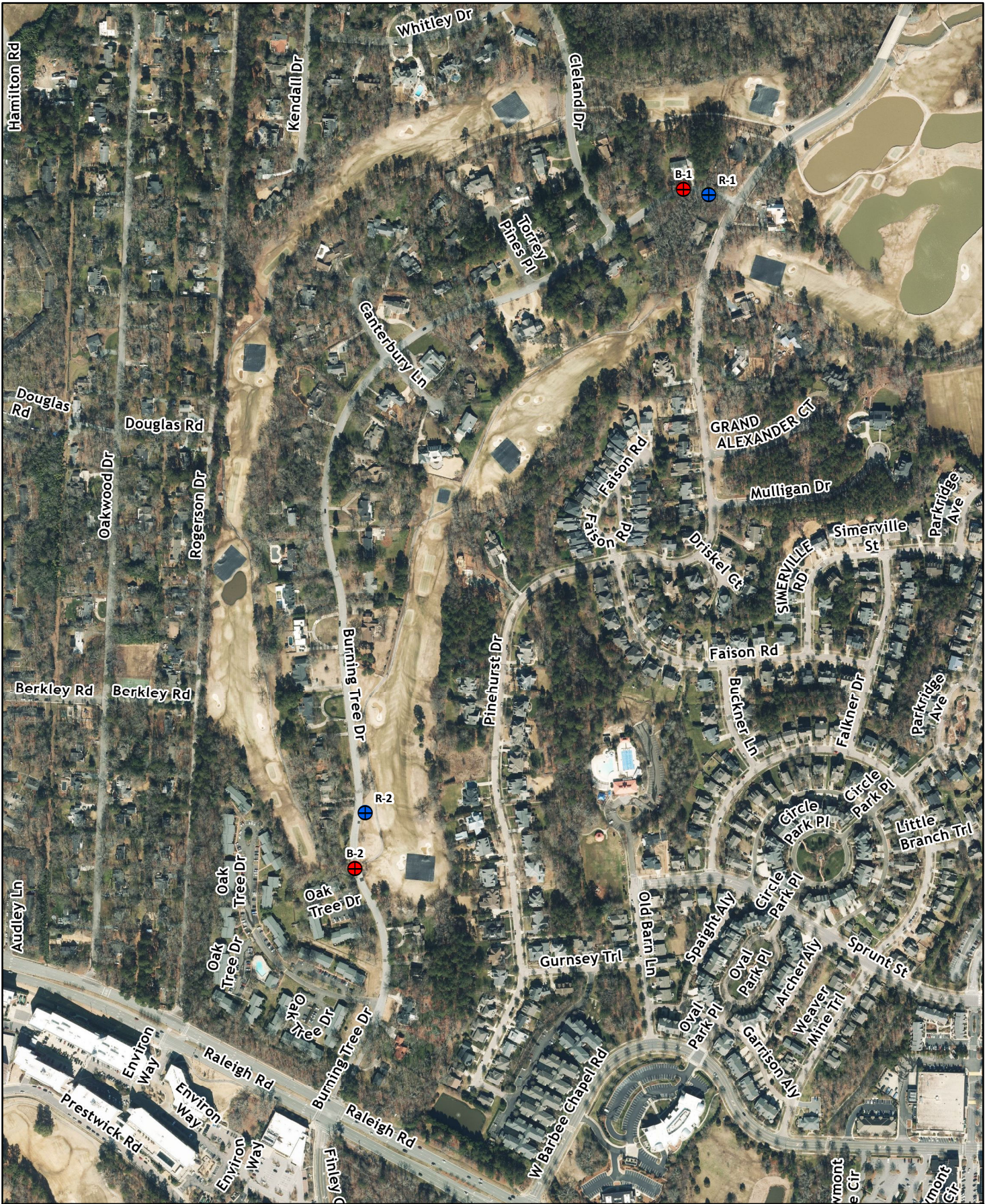
FROEHLING & ROBERTSON
Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	McKim & Creed
Project:	Burning Tree Drive Water Line
Location:	Chapel Hill, Orange County, NC
Project Number:	66C-0111
Date:	Open Street
Date:	November 2024

Scale: 1 inch = 2,000 feet

FIGURE
No.: **1**



Boring Location Plan

0 125 250 500 750 1,000 Feet



	FROEHLING & ROBERTSON		310 Hubert Street		
	Engineering Stability Since 1881		Raleigh, North Carolina 27603		
			T 919.828.3441		
	Client:		McKim & Creed		
	Project:		Burning Tree Drive Water Line		
Location:		Chapel Hill, Orange County, NC			
Project Number:		66C-0111			
Data:		NCOne Map Parcel 2023/ Aerial 2021			
Date:		November 2024		Scale: 1 inch = 500 feet	
FIGURE No.: 2					



Source: Esri, Maxar, E

Boring Location Plan

0 15 30 60 90 120 Feet



FROEHLING & ROBERTSON
Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	McKim & Creed
Project:	Burning Tree Drive Water Line
Location:	Chapel Hill, Orange County, NC
Project Number:	66C-0111
Data:	Client Provided Plan
Date:	November 2024
Scale:	1 inch = 65 feet

FIGURE
No.: 2A



Boring Location Plan

0 10 20 40 60 80 Feet



FROEHLING & ROBERTSON
Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	McKim & Creed
Project:	Burning Tree Drive Water Line
Location:	Chapel Hill, Orange County, NC
Project Number:	66C-0111
Data:	Client Provided Plan
Date:	November 2024
Scale:	1 inch = 45 feet

FIGURE
No.: 2B



FROEHLING & ROBERTSON

Engineering Stability Since 1881

SUBSURFACE PROFILE

Plot Based on Elevation

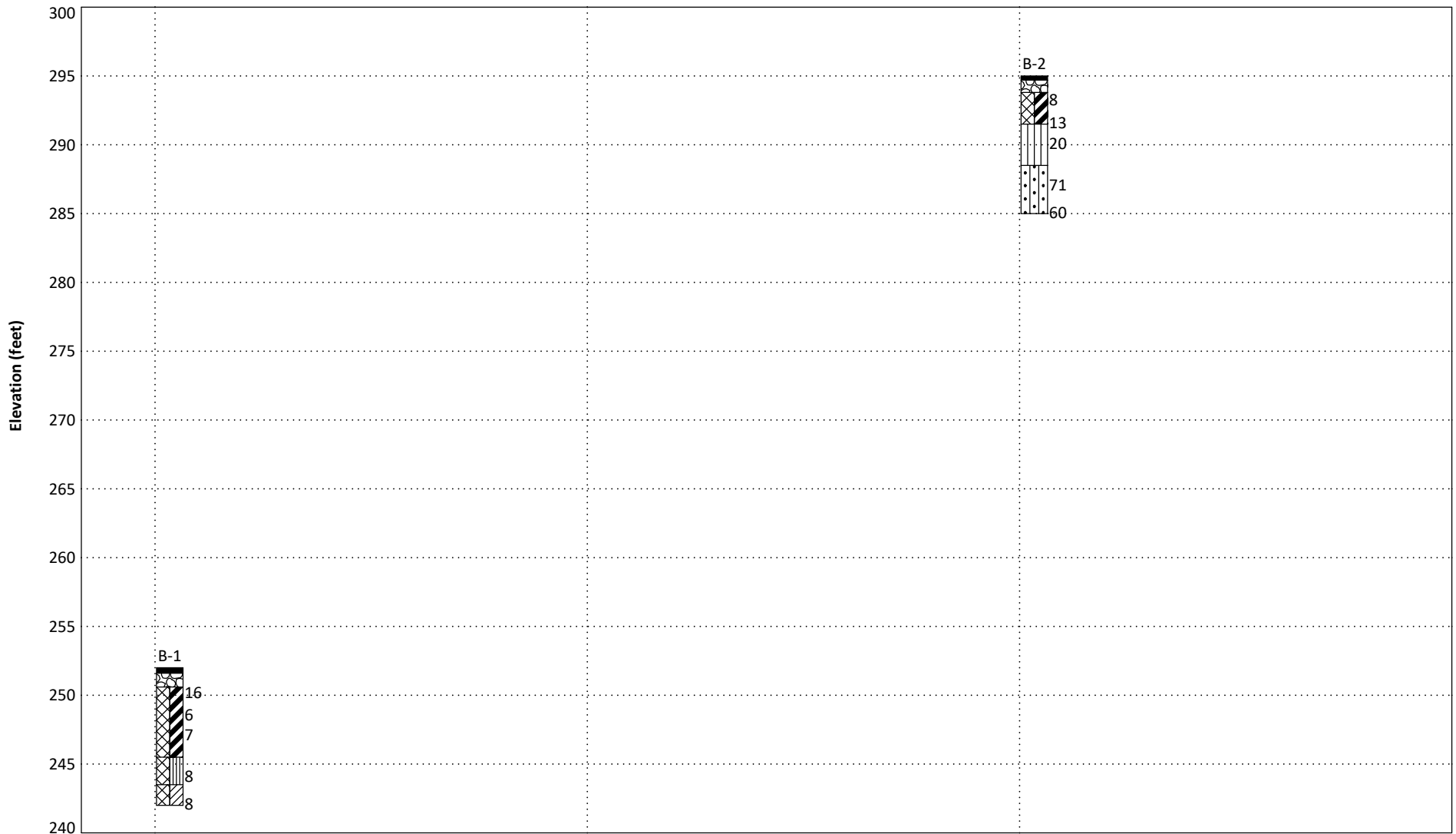
Profile Name: Figure No. 3

Project No: 66C-0111

Client: McKim & Creed

Project: Burning Tree Drive Water Line

City/State: Chapel Hill, NC





APPENDIX II

BORING LOGS



KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

<u>Sands and Gravels</u>		<u>Silts and Clays</u>	
<u>No. of Blows, N</u>	<u>Relative Density</u>	<u>No. of Blows, N</u>	<u>Relative Density</u>
0 - 4	Very loose	0 - 2	Very soft
5 - 10	Loose	3 - 4	Soft
11 - 30	Medium dense	5 - 8	Firm
31 - 50	Dense	9 - 15	Stiff
Over 50	Very dense	16 - 30	Very stiff
		31 - 50	Hard
		Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	<u>Coarse</u> - 3/4 to 3 inches diameter <u>Fine</u> - 4.76 mm to 3/4 inch diameter
Sand:	<u>Coarse</u> - 2.0 mm to 4.76 mm diameter <u>Medium</u> - 0.42 mm to 2.0 mm diameter <u>Fine</u> - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

<u>Approximate Content</u>	<u>Modifiers</u>	<u>Field Moisture Description</u>
≤ 5%:	Trace	Saturated: Usually liquid; very wet, usually from below the groundwater table
5% to 12%:	Slightly silty, slightly clayey, slightly sandy	Wet: Semisolid; requires drying to attain optimum moisture
12% to 30%:	Silty, clayey, sandy	Moist: Solid; at or near optimum moisture
30% to 50%:	Very silty, very clayey, very sandy	Dry: Requires additional water to attain optimum moisture

Ground Water

▽ Water Level in Bore Hole Immediately after Drilling

▼ Static Water Level after 24 Hours



UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION					TYPICAL NAMES
	GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
				GP	Poorly graded gravels
		GRAVELS with fines		GM	Silty gravels
				GC	Clayey gravels
	SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
				SP	Poorly graded sands
		SAND with fines		SM	Silty sands, sand/silt mixtures
				SC	Clayey sands, sand/clay mixtures
	SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
				CL	Sandy or silty clays of low to medium plasticity
				OL	Organic silts of low plasticity
	SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS					PWR (Partially Weathered Rock)
					Rock
					Asphalt
					ABC Stone
					Concrete
					Surficial Organic Soil



Project No: 66C-0111

Client: McKim & Creed

Project: Burning Tree Drive Water Line

City/State: Chapel Hill, NC

Elevation: 252 ±

Total Depth: 10.0'

Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA

Hammer Type: Automatic

Date Drilled: 10/21/24

Driller: W. Shenberger

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
251.6	0.4	ASPHALT		0.4		GROUNDWATER DATA: 0-Hrs: Dry, Caved at 4.4' Backfilled Immediately After Drilling
		ABC STONE	17-12-4		16	
250.6	1.4	FILL: Firm, Purple-Brown, Moist, Silty CLAY (CH) with Trace Mica		1.9		
			3-2-4	2.0	6	
			3-3-4	3.5	7	
				5.0		
245.5	6.5	Firm, Gray and Brown, Moist, Fine Sandy SILT (ML)	2-4-4	6.5	8	
				8.0		
243.5	8.5	Firm, Gray and Brown, Moist, Fine Sandy CLAY (CL)	2-3-5	8.5	8	
242.0	10.0	Boring Terminated at 10 Feet		10.0		

BORING LOG 66C-0111 BORING LOGS.GPJ F&R.GDT 11/11/24

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.



Project No: 66C-0111

Client: McKim & Creed

Project: Burning Tree Drive Water Line

City/State: Chapel Hill, NC

Elevation: 295 ±

Total Depth: 10.0'

Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA

Hammer Type: Automatic

Date Drilled: 10/21/24

Driller: W. Shenberger

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
294.7	0.3	ASPHALT		0.3		GROUNDWATER DATA: 0-Hrs: Dry, Caved at 4.9' Backfilled Immediately After Drilling
		ABC STONE	7-4-4		8	
293.8	1.2	FILL: Firm to Stiff, Gray-Brown, Moist, Fine Sandy CLAY (CH)		1.8		
			3-5-8	2.0	13	
291.5	3.5	RESIDUAL: Very Stiff, Gray and Orange-Brown, Moist, Fine Sandy SILT (ML) with Trace Mica	6-9-11	3.5	20	
				5.0		
288.5	6.5	Very Dense, Gray, Moist, Silty Fine SAND (SM) with Trace Mica	15-31-40	6.5	71	
				8.0		
			17-31-29	8.5	60	
285.0	10.0	Boring Terminated at 10 Feet		10.0		

BORING LOG 66C-0111 BORING LOGS.GPJ F&R.GDT 11/11/24

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.



APPENDIX III

LABORATORY TEST RESULTS

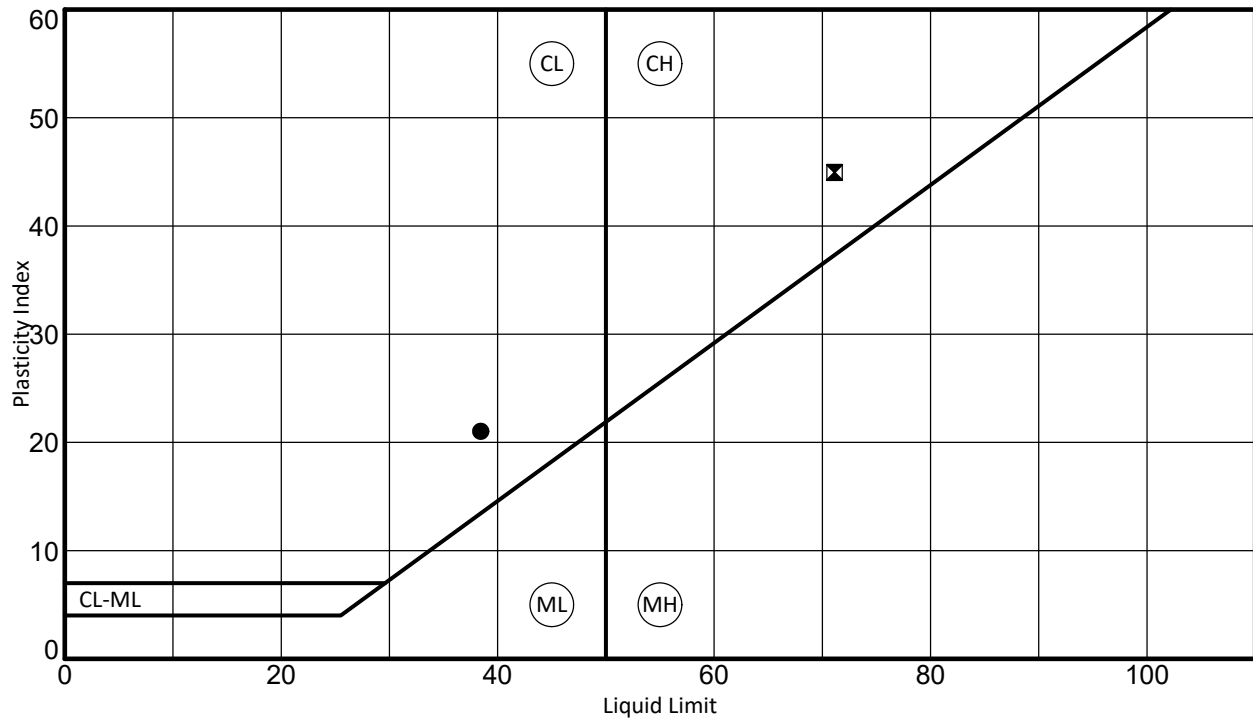


Project No: 66C-0111

Client: Mckim & Creed

Project: Burning Tree Drive Water Line

City/State: Chapel Hill, North Carolina



Boring No.	Depth	LL	PL	PI	% PASSING #200	Classification	% Natural Water Content
● B-1	8.5' - 10.0'	38	17	21	71.4	LEAN CLAY with SAND (CL)	20.6
⊠ B-2	2.0' - 3.5'	71	26	45	77.6	FAT CLAY with SAND (CH)	25.7



FROEHLING & ROBERTSON

Soil Resistivity Data Sheet

PROJECT NAME: Burning Tree Dr. Water Line
CLIENT NAME: McKim & Creed
PROJECT MANAGER: Dave Morse

PROJECT NO.: 66C-0111
DATE: 10/10/2024
TEST PERFORMED BY: Joshua Davis

A = (ft)	5	10	25	50	-		
Formula	957.56 *R	1915 *R	4788 *R	9576 *R	-		
Area 1 ("R-1") Measured Resistance, R (Ω)	3.36	1.48	0.35	0.14	-	Average Resistance, R (Ω)	1.33
Area 1 ("R-1") Calculated Resistivity, Δ (Ω - cm)	3217.39	2834.37	1675.73	1340.58	-	Average Resistivity, Δ (Ω - cm)	2267.02
Area 2 ("R-2") Measured Resistance, R (Ω)	3.20	1.40	0.47	0.16	-	Average Resistance, R (Ω)	1.31
Area 2 ("R-2") Calculated Resistivity, Δ (Ω - cm)	3064.18	2681.16	2250.26	1532.09	-	Average Resistivity, Δ (Ω - cm)	2381.92

Average Measured Resistance, R (Ω)	1.32
Average Calculated Resistivity, Δ (Ω - cm)	2324.47

11/5/2024

Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh, NC, 27603

Ref: Analytical Testing
Lab Report Number: 24-299-0005
Client Project Description: Burning Tree Drive Water Line
Chapel Hill

Dear Dave Morse:

Waypoint Analytical, LLC (Charlotte) received sample(s) on 10/25/2024 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in accordance with the applicable analytical method.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, method validations, instrumentation maintenance and calibration for all parameters were performed in accordance with guidelines established by the USEPA (including 40 CFR 136 Method Update Rule May 2021) unless otherwise indicated.

Certain parameters (chlorine, pH, dissolved oxygen, sulfite...) are required to be analyzed within 15 minutes of sampling. Usually, but not always, any field parameter analyzed at the laboratory is outside of this holding time. Refer to sample analysis time for confirmation of holding time compliance.

The results are shown on the attached Report of Analysis(s). Results for solid matrices are reported on an as-received basis unless otherwise indicated. This report shall not be reproduced except in full and relates only to the samples included in this report.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,



Angela D Overcash
Senior Project Manager

Certification Summary

Laboratory ID: WP CNC: Waypoint Analytical Carolina, Inc. (C), Charlotte, NC

State	Program	Lab ID	Expiration Date
North Carolina	State Program	37735	07/31/2025
North Carolina	State Program	402	12/31/2024
South Carolina	State Program	99012	07/31/2025
South Carolina	State Program	99012	12/31/2024

Laboratory ID: WP MTN: Waypoint Analytical, LLC., Memphis, TN

State	Program	Lab ID	Expiration Date
Alabama	State Program	40750	02/28/2025
Arkansas	State Program	88-0650	02/07/2025
California	State Program	2904	06/30/2025
Florida	State Program - NELAP	E871157	06/30/2025
Georgia	State Program	C044	11/14/2025
Georgia	State Program	04015	06/30/2024
Illinois	State Program - NELAP	200078	10/31/2025
Kentucky	State Program	90047	12/31/2024
Kentucky	State Program	80215	06/30/2025
Kentucky	State Program	KY90047	12/31/2024
Louisiana	State Program - NELAP	LA037	12/31/2024
Louisiana	State Program - NELAP	04015	06/30/2025
Mississippi	State Program	MS	11/14/2025
North Carolina	State Program	47701	07/31/2025
North Carolina	State Program	415	12/31/2024
Pennsylvania	State Program - NELAP	68-03195	05/31/2025
South Carolina	State Program	84002	06/30/2025
Tennessee	State Program	02027	11/14/2025
Texas	State Program - NELAP	T104704180	09/30/2025
Virginia	State Program	00106	06/30/2025
Virginia	State Program - NELAP	460181	09/14/2025

Sample Summary Table

Report Number: 24-299-0005
Client Project Description: Burning Tree Drive Water Line
Chapel Hill

Lab No	Client Sample ID	Matrix	Date Collected	Date Received	Method	Lab ID
95077	B-1, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10		
95077	B-1, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	SW-9034	WP MTN
95077	B-1, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	ASTM-G57-95	WP MTN
95077	B-1, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	SM-2580	WP MTN
95078	B-2, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10		
95078	B-2, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	SM-2580	WP MTN
95078	B-2, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	ASTM-G57-95	WP MTN
95078	B-2, S-3 (3.5-5') and S-4 (6.5-8')	Solids	10/21/2024	10/25/2024 13:10	SW-9034	WP MTN

Summary of Detected Analytes

Project: Burning Tree Drive Water Line

Report Number: 24-299-0005

Client Sample ID	Lab Sample ID					
Method	Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
B-1, S-3 (3.5-5') and S-4 (6.5-8')	V 95077					
9045D	pH	6.50	s.u.		10/28/2024 14:22	
ASTM-G57-95	Resistivity (soil)	2790	ohm-cm		11/05/2024 13:30	
SM-2580	Oxidation Reduction Potential	150	mV		10/31/2024 15:30	
SW-DRYWT	Moisture	14.0	%		10/28/2024 12:54	
B-2, S-3 (3.5-5') and S-4 (6.5-8')	V 95078					
9045D	pH	5.18	s.u.		10/28/2024 14:22	
ASTM-G57-95	Resistivity (soil)	2180	ohm-cm		11/05/2024 13:30	
SM-2580	Oxidation Reduction Potential	245	mV		10/31/2024 15:30	
SW-DRYWT	Moisture	12.7	%		10/28/2024 12:54	



Client: Froehling & Robertson, Inc. (Raleigh)
Project: Burning Tree Drive Water Line
Lab Report Number: 24-299-0005
Date: 11/5/2024

CASE NARRATIVE

Sulfide by Titration Method SW-9034

Analyte: Sulfide

QC Batch No: L781612

Matrix spike recovery is outside of control limits. Acceptable LCS recovery indicates the system was in control.

01083

Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh , NC 27603

Project Burning Tree Drive Water Line
Information :

Report Date : 11/05/2024
Received : 10/25/2024

Report Number : **24-299-0005**

REPORT OF ANALYSIS

Lab No : **95077**

Matrix: **Solids**

Sample ID : **B-1, S-3 (3.5-5') and S-4 (6.5-8')**

Sampled: **10/21/2024 0:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	2790	ohm-cm		1	11/05/24 13:30	VVP	ASTM-G57-95
Oxidation Reduction Potential	150	mV		1	10/31/24 15:30	SRP	SM-2580
Moisture	14.0	%		1	10/28/24 12:54	PEB	SW-DRYWT
Chloride	<291	mg/Kg - dry	291	10	11/01/24 15:05	KNC	9056A
pH	6.50	s.u.		1	10/28/24 14:22	MLW	9045D
Sulfate	<407	mg/Kg - dry	407	10	11/01/24 15:05	KNC	9056A
Sulfide	<29.0	mg/Kg - dry	29.0	1	10/31/24 08:30	TKM	SW-9034

Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit

01083

Froehling & Robertson, Inc. (Raleigh)
Dave Morse
310 Hubert St.
Raleigh , NC 27603

Project Burning Tree Drive Water Line
Information :

Report Date : 11/05/2024
Received : 10/25/2024

Report Number : **24-299-0005**

REPORT OF ANALYSIS

Lab No : **95078**

Matrix: **Solids**

Sample ID : **B-2, S-3 (3.5-5') and S-4 (6.5-8')**

Sampled: **10/21/2024 0:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	2180	ohm-cm		1	11/05/24 13:30	VVP	ASTM-G57-95
Oxidation Reduction Potential	245	mV		1	10/31/24 15:30	SRP	SM-2580
Moisture	12.7	%		1	10/28/24 12:54	PEB	SW-DRYWT
Chloride	<286	mg/Kg - dry	286	10	11/01/24 15:18	KNC	9056A
pH	5.18	s.u.		1	10/28/24 14:22	MLW	9045D
Sulfate	<401	mg/Kg - dry	401	10	11/01/24 15:18	KNC	9056A
Sulfide	<28.6	mg/Kg - dry	28.6	1	10/31/24 08:30	TKM	SW-9034

Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit

Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)
Project Description: Burning Tree Drive Water Line
Report No: 24-299-0005

QC Analytical Batch: V53514
Analysis Method: 9045D
Analysis Description: pH in Solids

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
pH	s.u.	6.86	6.82	99.0	3.54-101.4

Duplicate V 95077-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
pH	s.u.	6.50	6.51	0.1	20.0	10/28/24 14:22

Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)
Project Description: Burning Tree Drive Water Line
Report No: 24-299-0005

QC Prep:	V53622	QC Analytical Batch(es):	V53706
QC Prep Batch Method:	SW-9056A (PREP)	Analysis Method:	9056A
		Analysis Description:	Anions by Ion Chromatography

Lab Reagent Blank LRB-V53622 Matrix: SOL
Associated Lab Samples: 95077, 95078

Parameter	Units	Blank Result	MQL	Analyzed
Chloride	mg/Kg	<250	250	11/01/24 11:06
Sulfate	mg/Kg	<350	350	11/01/24 11:06

Laboratory Control Sample LCS-V53622

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Chloride	mg/Kg	400	376	94.0	80-120
Sulfate	mg/Kg	400	379	95.0	80-120

Matrix Spike & Matrix Spike Duplicate V 95577-MS-V53622 V 95577-MSD-V53622

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	MSD %Rec	%Rec Limits	RPD	Max RPD
Chloride	mg/Kg	<250	377	357	381	359	101	101	80-120	5.9	15
Sulfate	mg/Kg	<350	377	357	387	359	103	101	80-120	7.5	15



Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)

Project Description: Burning Tree Drive Water Line

Report No: 24-299-0005

QC Analytical Batch: L782233

Analysis Method: ASTM-G57-95

Analysis Description: Resistivity

Duplicate V 95077-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Resistivity (soil)	ohm-cm	2790	2790	0.0	20.0	11/05/24 13:30

Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)

Project Description: Burning Tree Drive Water Line

Report No: 24-299-0005

QC Analytical Batch: L781522

Analysis Method: SM-2580

Analysis Description: ORP

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Oxidation Reduction Potential	mV	200	194	97.0	90-110

Duplicate V 95078-DUP

Parameter	Units	Result	DUP Result	Criteria	Analyzed
Oxidation Reduction Potential	mV	245	249	+/- 20	10/31/24 15:30

Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)
Project Description: Burning Tree Drive Water Line
Report No: 24-299-0005

QC Prep: L781351 **QC Analytical Batch(es):** L781612
QC Prep Batch Method: SW-9030B **Analysis Method:** SW-9034
Analysis Description: Sulfide by Titration

Lab Reagent Blank LRB-L781351 Matrix: SOL
Associated Lab Samples: 95077, 95078

Parameter	Units	Blank Result	MQL	Analyzed
Sulfide	mg/Kg	< 25.0	25.0	10/31/24 08:30

Laboratory Control Sample LCS-L781351

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Sulfide	mg/Kg	280	160	57.0	32-85

Duplicate V 95078-DUP-L781351

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Sulfide	mg/Kg	< 25.0	<25.0	0.0	20.0	10/31/24 08:30

Matrix Spike V 95078-MS-L781351

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	%Rec Limits	Max RPD
Sulfide	mg/Kg	< 25.0	112		27.3		24.0*	25-75	

Quality Control Data

Client ID: Froehling & Robertson, Inc. (Raleigh)
Project Description: Burning Tree Drive Water Line
Report No: 24-299-0005

QC Analytical Batch: V53528
Analysis Method: SW-DRYWT
Analysis Description: Dry Weight Determination

Duplicate V 95064-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Moisture	%	14.0	13.9	0.7	20.0	10/28/24 12:54

Duplicate V 95071-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Moisture	%	6.63	6.44	2.9	20.0	10/28/24 12:54

Shipment Receipt Form

Customer Number: **01083**

Customer Name: **Froehling & Robertson, Inc. (Raleigh)**

Report Number: **24-299-0005**

Shipping Method

☐ Fed Ex	☐ US Postal	☒ Lab	☐ Other :	
☐ UPS	☐ Client	☐ Courier	Thermometer ID:	IRT15 22.9C

Shipping container/cooler uncompromised?	☒ Yes	☐ No
Number of coolers/boxes received	1	
Custody seals intact on shipping container/cooler?	☐ Yes	☐ No ☒ Not Present
Custody seals intact on sample bottles?	☐ Yes	☐ No ☒ Not Present
Chain of Custody (COC) present?	☒ Yes	☐ No
COC agrees with sample label(s)?	☒ Yes	☐ No
COC properly completed	☒ Yes	☐ No
Samples in proper containers?	☒ Yes	☐ No
Sample containers intact?	☒ Yes	☐ No
Sufficient sample volume for indicated test(s)?	☒ Yes	☐ No
All samples received within holding time?	☒ Yes	☐ No
Cooler temperature in compliance?	☐ Yes	☐ No ☒ Not Present
Cooler/Samples arrived at the laboratory on ice. Samples were considered acceptable as cooling process had begun.	☐ Yes	☒ No
Water - Sample containers properly preserved	☐ Yes	☐ No ☒ N/A
Water - VOA vials free of headspace	☐ Yes	☐ No ☒ N/A
Trip Blanks received with VOAs	☐ Yes	☐ No ☒ N/A
Soil VOA method 5035 – compliance criteria met	☐ Yes	☐ No ☒ N/A
☐ High concentration container (48 hr)	☐ Low concentration EnCore samplers (48 hr)	
☐ High concentration pre-weighed (methanol -14 d)	☐ Low conc pre-weighed vials (Sod Bis -14 d)	
Special precautions or instructions included?	☐ Yes	☒ No

Comments:

Sample was received outside of temperature compliance. Approval to analyze per

Signature:

Angelo Norvell

Date & Time:

10/25/2024 14:26:09



CHAIN OF CUSTODY RECORD

Waypoint Analytical LLC

449 Springbrook Road • P.O. Box 240543 • Charlotte, NC 28224-0543

Phone: 704/529-6364 • Fax: 704/525-0409

Client Company Name:

Froehling & Robertson, Inc.

Report To / Contact Name:

Dave Morris (D.Morris@F&R.com)

Reporting Address:

310 Hubert Street, Raleigh, NC 27603

Phone:

361.876.2118 (cell) / 704.409.7261 (office)

Fax (yes, no):

no

EDD Type (PDS, Level, Other):

PDF

Site Location Name:

Chapel Hill, NC

Site Location Physical Address:

Burning Tree Drive

Project Name:

Burning Tree Drive Water Line

Short Hold Analysis Needed (Yes or No):

No

UST Project (Yes or No):

No

Invoice To:

Froehling & Robertson, Inc.

Address:

310 Hubert Street, Raleigh, NC 27603

Purchase Order No./Billing Reference:

666-0111-00001

Requested Due Date (days):

1

Working Day? Requested:

6-9

10

Samples Received After 15:00 will be processed the next business day.

Turnaround time is based on business days, excluding weekends and holidays.

Please ATTACH any project specific reporting (QC LEVEL III III N) provisions and/or QC requirements

LAB USE ONLY

Yes

No

N/A

Samples intact upon arrival?

X

Received on NET ICT?

X

PROPER PRESERVATIVES?

X

Received WITHIN HOLDING TIMES?

X

CUSTODY SEALS INTACT?

X

VOLATILES rec'd w/OUT HEADSPACE?

X

PROPERT CONTAINERS used?

X

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL

Certification:

NEAC

USACE

FL

NC

SC

Other

N/A

Water Chlorinated (Yes or No) / N

Sample used Upon Collection (Yes or No):

Client Sample Description

Date Collected

Time Collected (Military Time)

Matrix (Soil, Water, Sludge, Other)

See Type Below (in Order of Analysis)

No.

Sizes (in Order of Analysis)

Preservatives (in Order of Analysis)

Moisture

Chloride

pH

Sulfide

Sulfate

Resistivity

Oxidation

Remarks

Printed Lab ID No.

Sampler's Signature

Sampled By (Print Name)

Affiliation

Upon relinquishing, this Chain of Custody is your authorization for Waypoint to proceed with the analyses as requested above. Any changes must be indicated on this form.

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Relinquished By: (Signature)

Method of Shipment: NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND

Prefix

Waypoint Field X OTHER

UPS SERVICES

Drinking Water: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

Other: NC

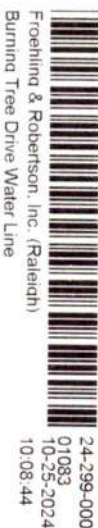
Other: NC

Other: NC

Other: NC

Other: NC

Other: NC



24-299-0005
01083
10-25-2024
10:08:44

Froehling & Robertson, Inc. (Raleigh)

Burning Tree Drive Water Line

PRIMA USE ONLY

Site Arrival Time:

Site Departure Time:

Field Tech Fee:

Mileage:

SEE REVERSE FOR TERMS & CONDITIONS

CDPR

See reverse for terms and conditions.



APPENDIX IV

GBA DOCUMENT

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org



Corporate HQ: 3015 Dumbarton Road Richmond, Virginia 23228 T 804.264.2701 F 804.264.1202 www.fandr.com

VIRGINIA • NORTH CAROLINA • SOUTH CAROLINA • MARYLAND • DISTRICT OF COLUMBIA

A Minority-Owned Business